Workbook and Manual in Psychology

Psychology Illustrated and Applied

G. Milton Smith
The City College of New York

Henry Holt and Company, New York

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To
K. W. S. and G. M. S. Sr.
whose warmth, and wit, and worth, and power of speech
have stirred the blood of all who know them.

Foreword

The third edition of the *Workbook and Manual in Psychology* has been enlarged and improved in three respects:

1. Classroom demonstrations which require no apparatus have been added for each chapter.

2. Questions on nineteen instructional films have been included, together with descriptive material and purchase and rental data.

3. There are now over fifty illustrations. In addition to the more conventional figures, these include cartoons and photographs from contemporary public life, the athletic field, and the world of adventure. Incorporated in numerous discussion questions, they bring home vividly the real-life applications of the principles in the text.

As in the earlier editions, the questions for discussion in each chapter are of three types: those based on the *text alone;* those which bring out the application of principles in the text to general life situations familiar to all; and those which require the application of principles to special fields of interest. Experience has shown that preparation of answers to a balanced sample of these questions will insure a provocative and instructive discussion.

There are also three kinds of objective exercises, all based on the text: true-false statements, multiple-choice questions, and matching exercises. These are intended to serve as a more detailed review and as a means of apprising the student, from week to week, of his grasp of the subject. The material for each chapter is on a separate sheet, with perforations; and the answer blanks are aligned to facilitate scoring.

I am most grateful to Professor Robert S. Woodworth for his generous contribution of demonstration material which appeared originally in eight chapters of our *Class Demonstrations in Psychology*, to Professor Donald G. Marquis for suggestions of great value in the selection of instructional films, and to both for the opportunity of working from their lucid and stimulating text.

G. M. S.

September 16, 1947
The City College of New York
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CHAPTER ONE

The Aim and Method of Psychology

Science is vastly more stimulating to the imagination than are the classics.
— J. B. S. Haldane

QUESTIONS FOR DISCUSSION

A. Text Questions

1. How does the work of psychologists in World War II give meaning to the somewhat whimsical definition of psychology as "what psychologists are interested in"?
2. Elaborate the definition of psychology as "the science of the activities of the individual."
3. Amplify (and criticize, if necessary) the following statements: Physiology is concerned with the organs of the individual; psychology is concerned with the organization of the individual; sociology is concerned with organizations of individuals.
4. What is meant by the statement that psychology employs a medium-scale map for charting life?
5. Make one significant remark about each of the following methods of studying the individual: (a) the resort to anecdotes; (b) reliance on general impressions; (c) the experimental method; (d) the developmental method; (e) the case-history method.
6. Outline the main procedures in the use of the experimental method.
7. What is meant by the term *experimental variable?* Illustrate. What is meant by "controlling conditions" in an experiment? Illustrate.
8. Give an illustration from the text of the use and the systematic testing of hypotheses.
9. Compare the experimental and the developmental methods. Are they mutually exclusive? Explain.
10. When is the case-history method in order? What are its limitations?
11. Compare objective and introspective data. Does psychology make use of each of these types of data or of only one of them? Illustrate.
12. Briefly, what is the relation of psychology to the natural sciences?
13. Discuss the relative merits of nouns, verbs, and adverbs in psychological terminology.

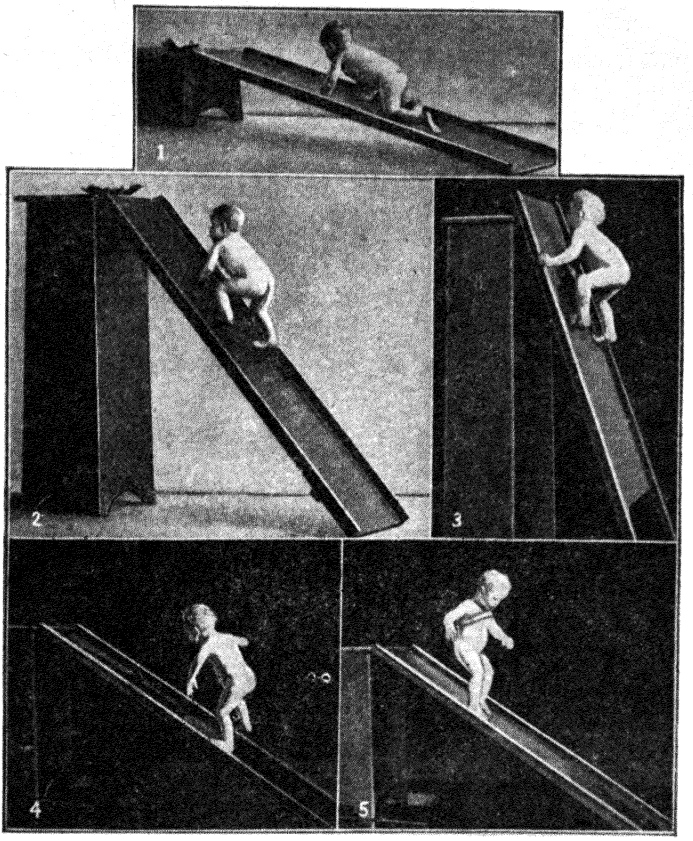

FIG. 2. Johnny masters the inclined plane. 1. Johnny, when 8½ months old, begins ascending a slide placed at an angle of 11° 2. At 10 months he ascends a slide placed at an angle of 48°. 3. At 21 months he scales a 70° slope. 4. and 5. Johnny at 13 months walks up and down an incline of 32°. These scenes are from a well-known study in which the influence of exercise, or use, on the development of certain behavior patterns was investigated. Johnny was given daily practice in slide climbing from the time he was 8 months old. As a result his performance was definitely superior to that of the other children investigated. No other child less than 24 months old succeeded in climbing a slide steeper than 48°. And Johnny's twin brother, Jimmy, whose activity was somewhat curtailed during the months of Johnny's special practice, was unable to master a 24° slide until over 22 months old, although he was somewhat more successful than Johnny when tested initially on the easiest inclines at the age of 8½ months.

These pictures illustrate the possibility of combining the experimental and developmental methods. Observation of the developing individual can be made more revealing by the periodic introduction of experiments and tests. (*Reprinted from* Growth: A Study of Johnny and Jimmy, *by Myrtle B. McGraw. Copyright, 1935, D. Appleton-Century Company, Inc.*)

notions that bad luck is associated with walking under a ladder, spilling salt, the number 13, black cats, broken mirrors, etc.? Did you support these views with anecdotal evidence or general impressions, or did you just accept them blindly, without questioning? What caused you to abandon them?

4. Can you think of some occasion in your own experience when you

have spontaneously made use of hypothesis and simple experimentation? (A youthful experiment on the tensile strength of a cat's tail, with observation of the resulting behavior, might be a case in point; or an experiment on the limits of patience, under various experimental conditions, of some irascible old Scrooge of your acquaintance.) Describe.

5. Examine Figure 2 and read the comment that goes with it. What factors other than practice might have made Johnny's performance on the slides superior to Jimmy's? Is it possible that Johnny's rate of development in general was faster than Jimmy's? (This was, of course, checked.) If they had turned out to be identical twins (as was originally assumed), rather than ordinary twins, could their rates of growth in general, as distinguished from growth in slide climbing, be regarded as controlled? Could emotional reactions to the slides affect the results? Why was the diet of the twins carefully controlled? Why did the experimenter pick for special training the twin that was initially poorer at slide climbing?

6. Look at Figure 3 and read the comment. This picture suggests more lines of questioning than can be followed at this point. Let us take only two of them at present: (a) As is pointed out, the psychological feat involved increases in difficulty as the height of the cliff increases. Is there any analogy between this and the increase in difficulty in speaking so commonly experienced when the speaker shifts from the breakfast table to the auditorium? Explain. Can you think of other analogies? How are these difficulties overcome? (b) This feat of "roping down" is common enough and safe enough for the experienced mountaineer at Alpine or Rocky Mountain altitudes. However, at Himalayan altitudes it might become a little hazardous because of the insidious effects of very high altitudes on memory, judgment, nervous stability, and other psychological functions. (Some of this lessening of mental efficiency is illustrated in Figure 1.) Can you think of any common activities that you can carry on without hesitation when in good condition, but which become risky if you are very tired, ill, or under the influence of drugs or strong emotion? Do some of these conditions affect your judgment so that you do not know at the time that you are running a risk, as is sometimes the case at very high altitudes on mountains or in airplanes? What precautions can be taken against such risks?

7. Do you make much use of introspective data in your daily life? Objective data? Give two examples of each. Would you be seriously handicapped without either type of data? Explain.

8. Do you find some subjective element in all so-called objective data? Are the terms *subjective* and *objective* relative or absolute terms? Explain.

C. Special Questions

1. In what respects do scientific hypothesis, theory, and law differ?

2. Have you ever experienced mountain or air sickness? Under what conditions? Did you acquire the symptoms sooner or later than your com-

Boyle's law or Ohm's law. Indicate which is the experimental variable and which variables are controlled.

4. Can you illustrate experimental method by reference to a simple experiment from the biological or social sciences? Why is this more difficult than a similar illustration from the physical sciences?

5. State briefly a classical hypothesis or theory associated with any two of the following names and tell the fate of each (i.e., is it still accepted; if not, what has surplanted it?): Copernicus, Laplace, Newton, Faraday, Lavoisier, Arrhenius, Descartes, Einstein, Lamark, Darwin, Pasteur, Koch.

DEMONSTRATION: THE CONTROL GROUP

Purpose. To demonstrate the use of the control group. This will be done by following in rough outline a procedure which might be used to test the effect on mental activity of some common psychological incentive, or of certain common drugs. Limitations of time and equipment, however, will make impossible the refinements necessary to control *all* the extraneous variables. Hence, the results will not be conclusive; but it will be instructive to observe how a control group can be used to eliminate many sources of error.

Materials. Pencils. Stop watch or other watch with second hand. It is not necessary to use any other materials in addition to the code test printed herewith if the method suggested in *Notes for Instructors* is employed. However, it makes for greater interest to use *one* of the following alternatives in sufficient quantity for half the members of the class: 1 cup of coffee, 1 small bottle of coca cola, or 1 cigarette for each member of the experimental group (see the third paragraph under *procedure*).[1]

Procedure. *Practice trial.* This trial of the arithmetic code test is taken by all members of the class. Just before giving the starting signal *E* will announce the letters to be entered in the blanks in the key. He will also announce the arithmetical operation to be indicated by either a + or a × sign in the parentheses above each group of four problems. Each problem will involve converting the two letters into the two digits indicated by the key and then either adding them or multiplying them together (as indicated) and entering the answer in the blank below. This is a test of speed and accuracy. The score will be the number of correct answers. *E* will call time at the end of 90 seconds. *The key should be concealed except during the tests.* It will be necessary to correct only enough items to make sure that the procedure is understood.

Initial trial. After clearing up any questions on the procedure following the practice trial, *E* will announce the operations to be indicated in the parentheses for the initial trial. You are to go on to the second row without

[1] A discreet quantity of port wine (say, three or four ounces) for each member of the experimental group and a corresponding amount of grape juice for the control group makes an even more interesting experiment.

stopping after you finish the first. The time allowed will be 90 seconds, as before. When the stop signal is given, turn the test over *at once* and carry out the instructions on the back carefully.

Experimental factor. After *E* has had a chance to glance over the results of the initial test, the class will be divided into two groups — a control group and an experimental group.[2] The members of the experimental group will adjourn to the hall or another room where they will be given special instructions, *or* where they will consume the coffee, coca cola, or cigarette, as the case may be, in about three minutes. (If the cigarette is chosen, inhaling is not recommended for novices; hence, it is best to ban this for all in order to keep this factor constant.)

Final trial. The procedure is the same as for the initial trial, except that *E* may announce different operations to be indicated in the parentheses just before giving the signal to start.

Computation. Correct the two trials, taking as the score in each case the number of items right. For each *O* get the ratio of his final score to his initial score, correct to two decimal places. This may be called the "effect ratio"; if greater than 1.00, it will indicate an apparent improvement; if less than 1.00, an apparent loss. Now get the average effect ratio for the experimental group and also for the control group.

Discussion. 1. If the average effect ratio for the experimental group is larger than 1.00, does this necessarily mean that the experimental factor has had a stimulating effect on mental activity? To what other factors might the gain be due? What would you expect to be the effect of such factors as practice, fatigue, unequal difficulty of the initial and final trials, working in a group as compared with working alone, suggestion as to what the experimental factor was supposed to do, and previous habitual use of the drug? Without the control group, would we have any idea which factor was responsible for the change in scores?

2. If we now compare the average effect ratio for the experimental group with that of the control group and get a significant difference,[3] we can narrow down the responsibility for any change to a much smaller number of factors. Which of the factors above have been "controlled" in some degree

[2] If the instructor desires, the groups may be equated in terms of initial trial performance, but the ratio technique used below makes this refinement somewhat excessive. If the class is large enough, three groups may be used: a control group and two experimental groups, one experimental group consisting of hardened coffee, coca cola, or cigarette addicts, and the other consisting of subjects who are not habitual users of these items but who are willing to risk a single indulgence in the interest of science.

[3] For a standard statistical procedure to test the significance, or reliability, of a difference between two averages see Smith, G. M., *A Simplified Guide to Statistics* (rev. ed.; New York, Rinehart & Co., 1946), Chapter VIII.

by the use of the control group; in other words, which factors affect the two groups equally and could not, therefore, be responsible for a difference between the averages? Which important one still remains uncontrolled? Until this factor is controlled in some measure, can we draw any valid conclusions about the influence of the drug alone? Explain. Assuming that any observed difference between the averages is not due to chance, what *combination* of factors is responsible?

3. Suggest a method for controlling the factor not controlled by our procedure. Can you suggest some other refinement in procedure?

4. Would you expect misleading results due to chance to be more common with small groups of subjects or with large groups? Explain.

5. What was the advantage of using effect ratios, of comparing each subject's initial performance with his own final performance? Why did we not simply compare the average scores of the two groups on the final trial and eliminate the first trial altogether?

6. Discuss the probable effects of increasing the dose of the drug and of varying the interval between indulgence and final trial.

ARITHMETIC CODE TEST

Practice Trial
Key

1	2	3	4	5	6	7	8	9	0
–	–	–	–	–	–	–	–	–	–

Operation:

( )				( )				( )				( )				( )			
A	D	J	E	H	D	C	G	A	G	E	I	D	G	H	A	E	A	C	G
C	H	D	G	I	A	F	B	F	D	B	C	F	B	E	I	F	H	B	O

Answer: –

(Continue with the second row as soon as you have finished this.)

Operation:

( )				( )				( )				( )				( )			
A	D	F	J	H	C	E	G	I	B	D	A	J	F	E	H	B	G	C	I
C	F	B	A	J	E	G	B	H	I	F	C	A	D	J	E	G	D	I	H

Answer: –

(As soon as time is called turn over this page.)

Initial Trial
Key

1	2	3	4	5	6	7	8	9	0
–	–	–	–	–	–	–	–	–	–

Operation:

( )				( )				( )				( )				( )			
D	A	F	J	H	I	C	G	B	H	E	F	J	A	D	B	I	G	E	C
C	F	D	A	J	E	G	B	H	I	F	C	A	D	J	B	G	B	I	H

Answer: –

(Continue with the second row as soon as you have finished this.)

Operation:

( )				( )				( )				( )				( )			
C	F	D	A	J	E	G	B	H	I	F	C	A	D	J	E	G	B	I	H
I	G	C	E	B	F	C	A	D	J	E	C	D	A	I	C	H	B	G	F

Answer: –

(As soon as time is called turn over this page.)

Final Trial
Key

1	2	3	4	5	6	7	8	9	0
–	–	–	–	–	–	–	–	–	–

Operation:

( )				( )				( )				( )				( )			
B	G	E	D	A	F	G	H	I	C	G	B	H	E	F	J	A	D	B	I
C	F	D	A	J	E	B	G	H	I	F	C	A	D	J	E	G	B	I	H

Answer: –

(Continue with the second row as soon as you have finished this.)

Operation:

( )				( )				( )				( )				( )			
B	G	E	A	D	F	J	H	D	G	E	I	B	D	H	J	F	E	H	B
C	F	B	G	A	E	B	G	H	I	F	C	A	B	G	H	I	H	B	E

Answer: –

(As soon as time is called turn over this page.)

Name_____ Row_____ Seat_____

INSTRUCTIONS

(1) *Fill in the blanks above* at once.

(2) *Keep this side up* unless specifically told to turn over by *E*.

(3) *Do not discuss your performance* on any trial with anyone.

(4) When *E* requests it, tear out this sheet carefully and hand it in *with this side up*.

Name_____ Section _____ Date _____

CHAPTER ONE

OBJECTIVE EXERCISES

A. True-false and Multiple-choice Questions

( ) 1. Psychology may be defined as the science of the activities of the individual.

( ) 2. Psychology, though a young science, has now practically caught up with the physical sciences in its achievements.

( ) 3. Physiology is concerned with the detailed functioning of the body's organs.

( ) 4. Sociology is interested in group relationships and the relation of the individual to the group.

( ) 5. The province of psychology lies somewhere between the province of physiology and that of sociology.

( ) 6. Which one of the following is *not* a common source of error in the use of anecdote and general impression for collecting data: (1) too small a sample (2) one-sided selection of cases (3) "uniformity of nature" (4) "memory error"?

( ) 7. A successful experiment is one that gets a clear "answer from nature."

( ) 8. The experimental method requires the use of apparatus.

( ) 9. Which one of the following factors is primarily responsible for air sickness: (1) fear of falling (2) motion of the plane (3) low atmospheric pressure (4) diminished oxygen supply (5) acclimatization?

( ) 10. Air sickness often affects the heart and the stomach, but fortunately seldom affects the memory and the judgment.

( ) 11. In the ideal experimental procedure all conditions but one are kept constant; this one condition or factor, the experimental variable, is varied systematically.

( ) 12. One of the aims of experimental science is to establish the truth of hypotheses.

( ) 13. The experimental method makes use of hypotheses and controlled conditions; the developmental method relies exclusively upon simple observation.

( ) 14. Which one of the following methods is *least* reliable in general: (1) the developmental (2) the case history (3) the experimental?

( ) 15. The behavior clinic must rely exclusively upon the case-history method.

( ) 16. For which group of people have we in general the most adequate case histories: (1) the normal (2) the delinquent (3) the great (4) the fine?

( ) 17. Introspection is a form of observation.

( ) 18. In psychology objective data are always preferable to introspective data.

( ) 19. With which one of the following classes of *O* can introspective data sometimes be used: (1) rats (2) very young children (3) apes (4) adolescents?

( ) 20. All data coming from within *O* are introspective data.

( ) 21. All but one of the following nouns should usually be thought of as a verb or an adverb in psychology. Which one is properly a noun: (1) organism (2) intelligence (3) memory (4) sensation (5) consciousness?

( ) 22. Psychological explanations are usually in terms of substances, forces, or faculties.

B. Matching Exercises

Answers: (1) individual (2) hypothesis (3) negative instances (4) experimental variable (5) low air pressure (6) motion of the plane (7) shortage of oxygen (8) altitude (9) introspection (10) same (11) birth.

( ) 23. Psychology focuses its attention on the . . . . . .

( ) 24. One reason why general impressions are untrustworthy sources of data is that we are apt to neglect the . . . . . .

( ) 25. In experimental science a . . . . . cannot be absolutely proved correct, but it may be shown to be very probable because consistent with known facts.

( ) 26. In a psychological experiment *E* tries to find how *O* reacts to a change in one of the conditions, to the . . . . . .

( ) 27. In the developmental method we start to study the individual from before . . . . . .

( ) 28. It would be absurd to say that psychology should make no use of objective data and rely exclusively on . . . . . for its data.

( ) 29. Air sickness is primarily due to the . . . . . .

( ) 30. Introspective data and objective data are fundamentally the . . . . . : both depend on observations by people.

CHAPTER TWO

Individual Differences in Ability

My sone, I aperceyve wel by certeyne
evydences theyn abilite to lerne sciences.
— Chaucer

QUESTIONS FOR DISCUSSION

A. Text Questions

1. How can you reconcile the statement from the Declaration of Independence that "all men are created equal" with individual differences in ability and personality so widely observed?

2. Compare achievement and capacity. Which is usually greater? Which is more readily affected by training? Which is easier to measure? Why?

3. What is aptitude? What is the purpose of aptitude tests? Discuss their limitations.

4. What is meant by a "raw score"? What must be done to give it meaning (in addition to defining it)?

5. What are the general characteristics of a "normal distribution" of scores? What are two common measures of the center of a distribution? Two common measures of scatter?

6. Describe two ways in which you might indicate an individual's relative position in a distribution of scores. What advantage do these measures have over raw scores?

7. Amplify and illustrate the statement: "intelligence is intellect put to use." What is the relation between intelligence and knowledge?

8. Tell briefly how morons, idiots, and imbeciles, as a group, differ from normal persons. Tell briefly how they differ from each other (without recourse to the method of introspection, if possible).

9. Compare briefly the three following kinds of intelligence tests: Binet, group, performance. Distinguish between intelligence tests and achievement tests; intelligence tests and aptitude tests.

10. Discuss briefly the nature of intelligence, as revealed by an analysis of test items.

11. Compare the meanings of MA and IQ. What is the advantage of expressing mental development in terms of MA?

12. How constant is the *average* IQ? How constant is the *individual* IQ? What are some of the factors that make for constancy? Some that make for fluctuation?

13. Since mental maturity, as measured by intelligence tests, is reached somewhere in the teens, and since chronological age cannot be halted (despite the efforts of beauty experts), why doesn't the IQ begin to decrease sharply during this period? How are the IQ's of adults computed?

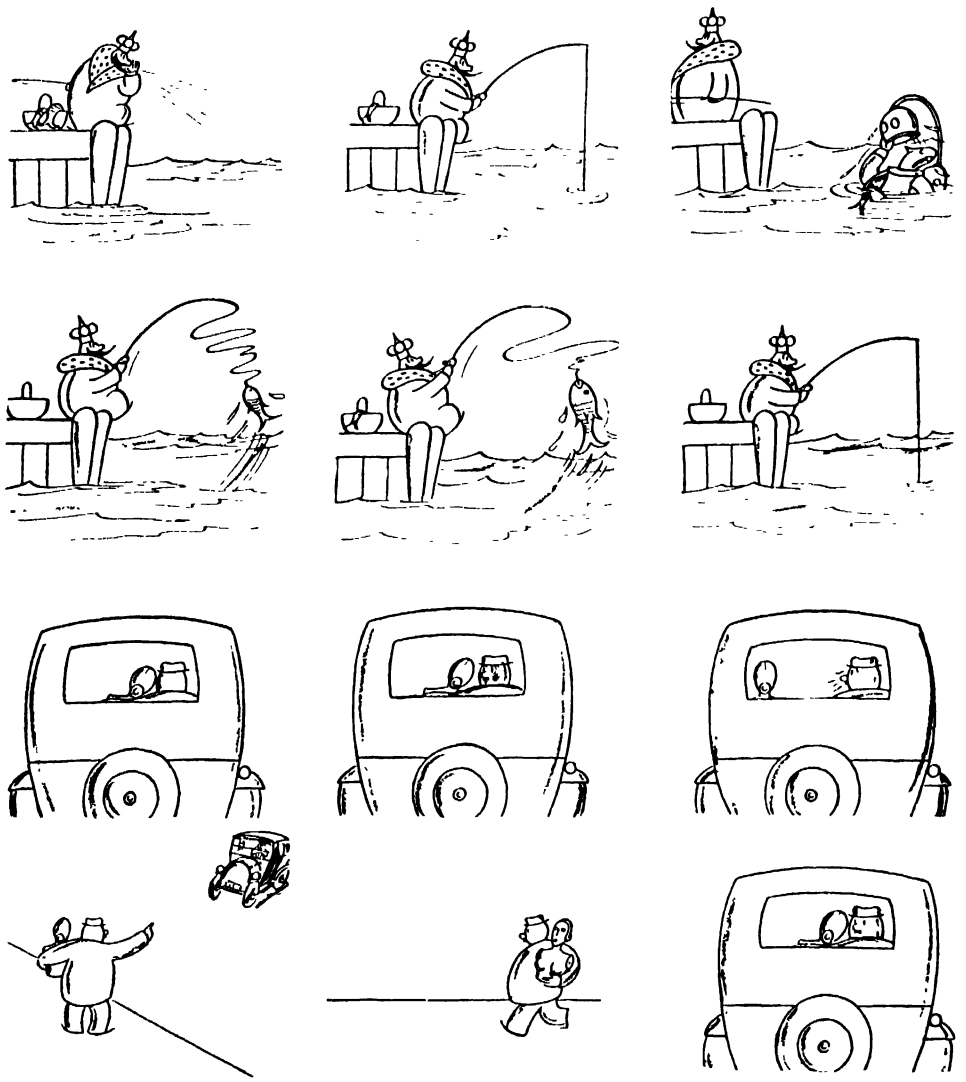

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FIG. 4. Picture arrangement test (incomplete) from The Wechsler-Bellevue Intelligence Test. Each of these two cartoon sequences is to be arranged so as to make a sensible narrative, however humorous. These two sequences are the most difficult of six which make up this part of the test. The time limit for each is two minutes, but extra credit is given for quicker work. (*Reproduced by permission of Dr. Wechsler.*)

14. Discuss briefly the distribution of intelligence in the general population. What is the approximate range of IQ's? Show why a rare IQ is not necessarily desirable. Comment briefly on the results of the new army intelligence tests.

B. General Questions

1. The Chaucer quotation at the beginning of this chapter was written many centuries before standardized aptitude tests were ever thought of. What kinds of "evydences" of "abilite to lerne sciences" could Chaucer have had in mind? Are they still used? Are they objective or adequate?

2. Do you know of anyone whose achievement and capacity differ widely? Explain.

3. Do fashion, manners, and customs operate to lessen native differences? Is this desirable, in whole or in part? Explain.

4. Would it aid one in his adjustment to life to know early in the game the facts of individual differences in such things as intelligence, physical strength, attitudes, and honesty? Explain.

5. What is the advantage of knowing a child's approximate IQ at the tender age of, let us say, 20 months, when the problem of vocational selection is not really pressing? What is the disadvantage? What is the advantage of knowing one's own IQ at any age? The disadvantage?

6. If mental maturity is reached in the late "teens," why are somewhat older people usually greater assets to a business or a profession than young people in their "teens"? In what respect is this true? In what respect not true?

7. What are the difficulties involved in getting an estimate of the relative intelligence of the two sexes? Assuming the two sexes to be approximately equal in intellectual capacity, how do you account for the much greater number of eminent men throughout history?

8. Work out the solutions to the picture arrangement test in Figure 4 if you can. What kind of ability or knowledge does this test require of you? Is it similar to that called for by other kinds of intelligence tests? Illustrate and explain. Would you expect a positive correlation between this and other intelligence tests? Which type of intelligence test would you expect to correlate most closely with school marks? What are the special uses of this particular type of test?

9. Puzzle-solving and Intelligence. Below are three puzzles. None of them is obvious and the last, at least, is quite difficult for most people. Try your luck with them. If you succeed in getting them all within an hour or so, you are certainly not a moron; you are probably even bright. But if you fail, you are not necessarily stupid by any means. Explain how these last two statements can both be true. Why should there be any relation between puzzle-solving ability and intelligence? Give two practical reasons

why puzzles like these are not used in the determination of IQ's. (The solutions are given on page 18.)

Puzzle *A:* Place ten coins in pyramid formation, as in Figure 5*a*. By moving *only three* coins cause the pyramid to point downward, as in Figure 5*b*.

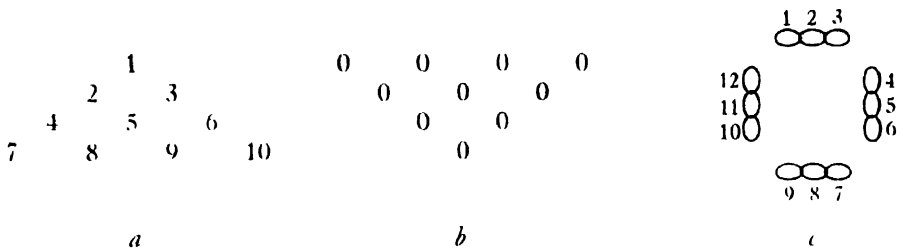


Fig. 5 For Puzzles A and B.

Puzzle *B:* A frugal farmer went to the blacksmith's with four three-link fragments of old chain and asked him how much it would cost to fasten them all together into one circular twelve-link piece. The blacksmith said, "I'll have to charge you a quarter for each link I cut open and forge together again; that will come to just a dollar, then." The farmer insisted that the job could be done for 75 cents, that it was necessary to cut only three links. The farmer was right; show how. (See Figure 5*c*, which represents the four fragments.)

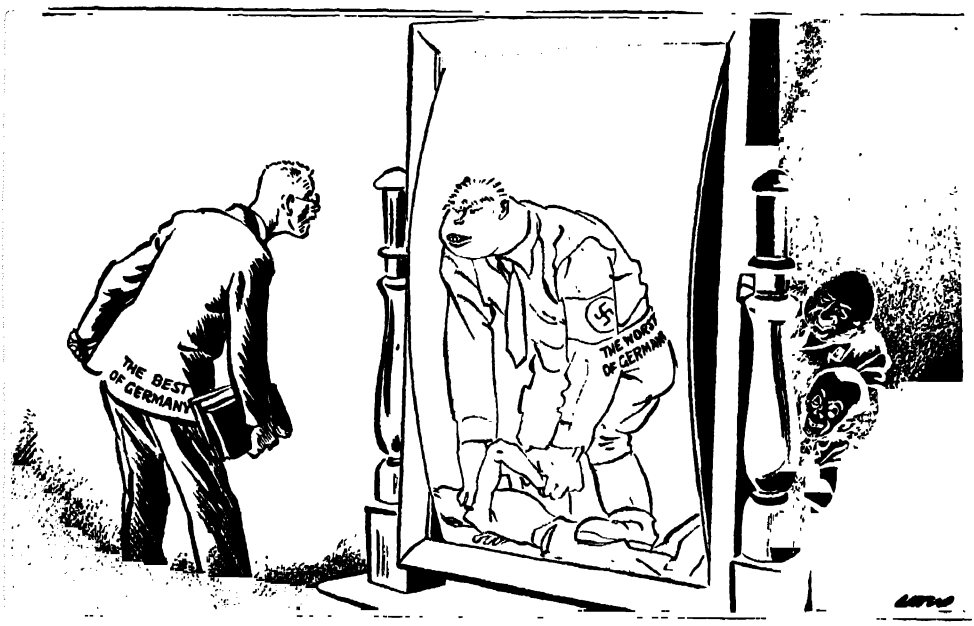
Puzzle *C:* An elderly ranch owner, in order to decide which of his three highly intelligent and equally attractive assistants was the *most* intelligent, and therefore the most worthy to inherit both the ranch and his fair daughter's hand, confronted the young men with an ingenious homemade intelligence test. While the three were blindfolded the rancher put an ink spot on each of their foreheads. They were told that it was either red or black. Just before the blindfolds were removed each was instructed to raise a hand as soon as he saw a red spot on anyone else and to lower the hand as soon as he had figured out the color of his own spot. As soon as the blindfolds were removed three hands shot up. *After several minutes* one hand came down. What was the conclusion and how was it reached? (Hint: Keep in mind the fact that all three were very bright and that only after several minutes did one hand come down.)

C. Special Questions

1. Goethe once said: "Two souls dwell within the German heart." This could mean "two conflicting tendencies within the same individual," or "two widely differing kinds of people within the German nation." What implications does the Low cartoon have (see Figure 6 and comment)? Is this implication equally true of other peoples? Explain.

2. Refer to Figure 6 again. The cartoonist was of course attacking the

notion that the Nazi stereotype was a true picture of the German people. Yet he did this by means of stereotypes. Was he just committing the same fallacy all over again, or was this legitimate artistic license? Would cartoonists in general be seriously handicapped if they did not make use of stereotypes? Is there any danger in this use of stereotypes? Explain.



"Himmel! Is that me?"

FIG. 6. This cartoon by David Low, one of the most brilliant political cartoonists of our day, serves to remind us that not all Germans were ardent Nazis. Individual differences were a reality in Germany, though they found it hard to gain recognition in a totalitarian state. We need reminders of this sort from time to time, for we commonly think in terms of "stereotypes." We tend to judge whole groups in terms of small and inadequate samples. We think of all Chinese as laundrymen, or as victims of political intrigue; we think of all Harvard men as snobs with Oxford accents; and we try not to think of Oxford men at all. This is another form of the type fallacy and one of the principal roots of prejudice. (*From* A Cartoon History of Our Times, *by David Low. Reproduced by permission of Simon and Schuster, publishers.*)

3. Archimedes, the ancient Greek philosopher, was asked by the king to determine without in any way injuring the crown, whether a gold crown which he had ordered had been adulterated with silver. Puzzled for sometime, he at length hit upon a method of solution by observing the way in which his body caused the water to spill over in a public bath. Leaping from his bath with a cry of "Eureka" ("I have found it!"), he rushed home through the streets, dripping wet and in the scantiest of attire. Was this the behavior of an intelligent man? Explain.

4. Alexander the Great has been described, not as a great statesman, but as "a mere collector of countries." Do you agree with this or do you think his record places him with men of exceptional intelligence? Why?

5. To Schopenhauer are attributed the following touching remarks about Hegel: "But the height of audacity in serving up pure nonsense, in stringing together senseless and extravagant mazes of words, such as had previously been known only in madhouses, was finally reached in Hegel. — The result will remain a monument to German stupidity." Is this fair to Hegel? Is this fair to the German people? Explain.

6. Which was the more intelligent, Gilbert or Sullivan? Why is it difficult to answer this question? What bearing does this have on the problem of measuring the intelligence of adults?

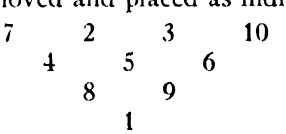
INDIVIDUAL AND GROUP DIFFERENCES IN INTELLIGENCE TEST SCORES

Purpose. (a) To demonstrate individual differences in *tested* intelligence within a small selected group; (b) to compare such a group with a large, relatively unselected group, with respect to both median performance and variability, or scatter; and (c) to analyze several typical intelligence test items.

Materials. Any standard group intelligence test. (See *Notes for Instructors.*) If a revision of the Army Alpha Examination is used, a direct comparison may be made between the individual and class results and the norms printed on this page, which are based on a sample of approximately 1,500,000.[1]

SOLUTIONS TO PUZZLES ON PAGE 16

A: Coins 1, 7, and 10 are moved and placed as indicated in the diagram below:



B: Link 1 is cut, separated from 2, linked through 9 and 10, and forged together. Similarly, link 2 is cut, separated from 3, and used to join 6 and 7. Link 3 then completes the circle by joining 4 and 12.

C: All three must be red. The steps in the reasoning are as follows: (1) There must be at least one red spot or no hands would have been raised. (2) Since three hands were raised, there must be at least two red spots; for if there had been only one red spot, one of the men would have seen two black spots and would have kept his hand down. (3) There remain two possibilities: (a) two are red and one black; or (b) they are all red. Now if (a) is correct, two of the suitors will see one red and one black spot. Being bright young men, they will have reached step (2) in their reasoning very quickly; and if they see one black spot, they will know that their own spots must be red and will put their hands down. (4) But the bright young men did *not* put their hands down in a *short* time. Hence, reasoned the brightest of the bright young men, (b) must be the correct alternative. (P.S. He got the jobs.)

[1] Norms are available for any standard test, but the samples are much smaller and more selected than the Army Alpha sample.

Procedure. The instructor will administer a group intelligence test following the standard procedure described in the instructions accompanying the test used. The instructor will then read the answers (in a second hour, if necessary) and each *O* will score his test.

Results. The results may be summarized by means of a tally and a frequency distribution on the blackboard; and from this the median, the 25th and 75th centiles, and the range may be determined. Or these values may be determined by a show of hands. Record the class results below, together with the norms for the large group:

	Median	25th centile	75th centile	Range
Your class:				
Large group norms:				

SELECTED CENTILE NORMS FOR THE GENERAL POPULATION ON THE ARMY ALPHA EXAMINATION * OR STANDARD REVISION

Score	Centile	Score	Centile
31	20	135	92.5
36	25	146	95
61	50	160	97.5
93	75	174	99
103	80	180	99.5
113	85	189	99.9
126	90	195	99.95

* Based on the performance of approximately 1,500,000 literate native white drafted men, plus about 75,000 officers, in World War I

Discussion. In any comparison of intelligence test scores the distinction between tested intelligence and general intellectual capacity should be kept in mind. Test results may be very unfair to people whose educational backgrounds are far from standard. Furthermore, if the test you took puts a heavy premium on speed, rather than "power," a difference in scores of ten or more points may be due to this factor alone.

1. What are some other factors that may make individual test scores not directly comparable?

2. Is your class median higher or lower than the median for the larger group? Explain.

3. What two measures of variability do the group results entered above include?

4. Is the variability of your class greater or less than that of the larger group? Why would you expect this result?

5. By referring to the centile norms for the Army Alpha Examination estimate what percent of the general population score: (a) between 36 and 93 _____; (b) between 31 and 103 _____; (c) below 31 _____; (d) 126 or above _____; (e) 174 or above _____; (f) 195 or above _____.

6. Most standard intelligence tests contain items of several of the following kinds: vocabulary, numerical problems, analogies, disarranged sentences, general information, spatial relations, simple arithmetical relations. Analyze sample items from the test you took with respect to the following points: (a) Do they test alertness? (b) Do they test reasoning ability? (c) Do they test general knowledge? (d) Do they test specialized knowledge based on formal education?

7. Which of the four factors in the question above do you think should be most heavily emphasized in an intelligence test, which is presumably intended to be an estimate of general intellectual capacity? Which factor should be minimized? Do you think there is likely to be any relation between an individual's alertness and his general knowledge? Would it be easy to test one independently of the other?

Optional Supplementary Exercise

8. Calculate the mean (or average) and the standard deviation (σ) for *two* random samples of ten intelligence test scores from your class, by means of the form below. In this M stands for the mean, X stands for any individual score, x stands for the deviation of any individual score from the mean ($X-M$), and Σ is a standard symbol which means "the sum of."

	First Sample			*Second Sample*		
	X	x	x^2	X	x	x^2
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
	$\Sigma X =$		$\Sigma x^2 =$	$\Sigma X =$		$\Sigma x^2 =$
	$N = 10$			$N = 10$		

$$M = \frac{\Sigma X}{N} = \frac{\quad}{10} = \quad \qquad M = \frac{\Sigma X}{N} = \frac{\quad}{10} = \quad$$

$$\sigma = \sqrt{\frac{\Sigma x^2}{N}} = \sqrt{\frac{\quad}{10}} = \quad \qquad \sigma = \sqrt{\frac{\Sigma x^2}{N}} = \sqrt{\frac{\quad}{10}} = \quad$$

Are the two M's and σ's identical? Why not? Would you expect them to be more nearly equal if the samples had been larger? Explain. This suggests the importance of using fairly large samples whenever possible for a more adequate appraisal of a group. It is also desirable to compare any individual or group with norms based on a large sample when available.[2]

FILM

The Stanford-Binet Test Demonstrated

The film *Testing the IQ*[3] shows Prof. H. E. Garrett of Columbia University testing a charming little five-year-old girl with sample items at each appropriate age level from the 1937 revision of the Stanford-Binet Test. The principles are explained, and the materials and techniques of administration are clearly shown. The IQ is determined in standard manner. After

[2] For a simple explanation of the significance of σ and of tests of significance for a difference between two means, see Smith, G. M., *A Simplified Guide to Statistics*.

[3] *Testing the IQ* (Gilbert and Garrett). Silent. International Film Bureau, 84 East Randolph St., Chicago, Ill. Length 375 ft. Price $23.00.

seeing the film you should be able to mark the following true-false statements correctly, using a + for true and a − for false or partly false.

( ) 1. The "basal age" is the mental age level at which all items are passed.
( ) 2. The child was tense and anxious during the first half of the test.
( ) 3. Vocabulary was tested in part by asking the child to name common objects shown in pictures.
( ) 4. Pictures were used in at least three tests.
( ) 5. There was no test of recent memory.
( ) 6. There was no check on numerical ability.
( ) 7. The child passed all items at the five-year level.
( ) 8. The child's MA was higher than her CA.

(Scoring key is given in *Notes for Instructors*.)

Name_____ Section_____ Date _____

CHAPTER TWO

OBJECTIVE EXERCISES

A. True-false and Multiple-choice Questions

( ) 1. A successful government must take into account the facts of individual differences in ability.

( ) 2. Which *one* of the following is false: (1) achievement is actual ability (2) a capacity needs training (3) achievement often exceeds capacity (4) capacity is not unlimited?

( ) 3. Evidence for capacity is usually less direct than evidence for achievement.

( ) 4. The achievement shown after preliminary practice is an excellent indicator of ultimate capacity.

( ) 5. Aptitude is predicted achievement.

( ) 6. The "raw score" by itself is a meaningful measure of achievement on a "speed test," but it does not tell us very much when derived from a "difficulty test."

( ) 7. In psychology the word *range* is most closely associated with: (1) kitchen equipment (2) average ability (3) correlation of abilities (4) a solitary horseman (5) extreme scores.

( ) 8. In a normal distribution the median is equal to approximately one-half the range.

( ) 9. The standard deviation is usually larger than the average score.

( ) 10. Intellect is a comprehensive term not only for observing, understanding, and thinking, but also for gaining knowledge and remembering.

( ) 11. Which one of the following is the *least* intelligent: (1) genius (2) moron (3) normal (4) idiot (5) imbecile?

( ) 12. Some morons can even be taught to take care of animals, tend babies, do carpentry, and operate sewing machines; whereas, idiots cannot learn to wash and dress themselves, to talk beyond a few monosyllables, or to avoid the common dangers of life.

( ) 13. Genius is usually characterized by such qualities as self-confidence, persistence, and desire to excel, in addition to high intelligence.

( ) 14. Which one of the following did the earliest work in measuring intelligence: (1) Terman (2) Thurstone (3) Stanford (4) Di Maggio (5) Binet?

( ) 15. The Binet test is a good example of: (1) a group test (2) an individual test (3) a performance test (4) an achievement test.

( ) 16. Which one of the following is *not* a common characteristic of intelligence tests: (1) extremely varied (2) stress mechanical ingenuity (3) draw in some measure upon past experience (4) place the subject in a somewhat novel situation (5) call for persistence and endurance?

( ) 17. If a child just 10 years old is of exactly average intelligence, his MA will be: (1) 5 years (2) 50 (3) 100 (4) 10 years (5) 200.

( ) 18. The MA is a relative measure of intelligence; the IQ is an absolute measure.

( ) 19. The *average* IQ is constant throughout childhood.

( ) 20. Because of the fluctuation in *individual* IQ's the individual IQ obtained in childhood has very little predictive value.

( ) 21. So far as we can now measure intelligence, the indications are that maturity is reached at the age of: (1) 11-14 (2) 15-18 (3) 19-22 (4) 23-26 (5) 27-30.

( ) 22. Since the MA does not increase beyond a certain age and the CA does, the IQ declines sharply after this age is reached.

B. Matching Exercises

Answers: (1) symmetry (2) morons (3) performance (4) Binet (5) achievement (6) novel (7) injury (8) idiots (9) comparison (10) fluctuation (11) dull people.

( ) 23. Capacity may be limited by . . . . .

( ) 24. Our evidence for aptitude is usually based on observed . .

. .

( ) 25. A "raw score" becomes meaningful only by with other scores.

( ) 26. A normal distribution is characterized by . .

( ) 27. Imbeciles are more intelligent than . .

( ) 28. Group tests on the whole may be less adequate than individual tests of the . . . . . type.

( ) 29. Most intelligence test items place the subject in a somewhat . . . situation.

( ) 30. Some in the individual's IQ is inevitable when he is tested several times.

CHAPTER THREE

The Correlation of Abilities

God give them wisdom that have it; and those that are fools, let them use their talents.

- Twelfth Night

QUESTIONS FOR DISCUSSION

A. Text Questions

1. Is the term *idiots savants* meant to be taken literally? If not, what does it imply? Illustrate.

2. How do you explain the feats of arithmetical prodigies if they are not generally brilliant? Cite another fairly common example of marked unevenness in mental achievements.

3. What is meant by a "perfect positive correlation" between two sets of scores? Illustrate. What is meant by a "perfect negative correlation"; a "zero correlation"? How are these relationships and intermediate relationships expressed?

4. Give the formula for the rank-difference measure of correlation and identify the symbols. Illustrate the method of ranking tied scores.

5. What is meant by compensation between two abilities, or between two tests? Is correlation among abilities or compensation the more common? Illustrate.

6. How does correlational data disprove both the single-factor theory of ability and the theory that every task calls for a separate specific ability? How well does the two-factor theory fit the observed correlational data?

7. What is meant by a group factor? What correlational evidence suggests the existence of group factors? Mention five or six group factors that have been found.

8. Why is the expression "verbal ability" misleading when applied to a verbal group factor? Which is the broader, verbal or numerical ability? Explain. In what way does spatial ability involve the use of words?

9. If there is such a thing as general ability, of what does it consist according to Thorndike and according to Spearman? What sort of evidence indicates a progressive differentiation of abilities with age?

10. What type of test is used to predict vocational success? In what two ways is the dependability of such a test measured? How is a "criterion" used in checking dependability? Illustrate.

11. How well do intelligence tests predict success in school and college (a) for groups and (b) for individuals? Is the correspondence between IQ's and grades closer near the bottom of the academic ladder, in high school, or in college? Explain.

12. Discuss briefly the prediction of success in pilot training. Does the low correlation between intelligence test results and success prove that intelligence was unimportant? Explain. How was the highest validity obtained?

13. Sketch some of the general steps used in selecting employees by an aptitude testing program. Does such a program have any bearing on vocational guidance? Explain.

B. General Questions

1. High-grade morons can be taught to operate sewing machines and even to drive cars; or, at least, they get operator's licenses. Judging by appearances, many of the morons that sit behind the wheel of the other fellow's car are of the low-grade variety. Is this common ineptitude in driving in people otherwise normal comparable to reading disability? Is it an actual lack of capacity, a ruthless indifference to others, absent-mindedness, the result of some emotional handicap, or what?

2. Do you know anyone who is markedly uneven in his or her mental abilities? From your observation do you think this is due to a corresponding unevenness in capacities, or due more to unequal interest and unequal training, or due to some emotional reaction to certain tasks?

3. There is a slight negative correlation between intelligence and delinquency. Can you recall anything in your own experience which (by analogy) enables you to understand why the tendency to delinquency should be greater in the feebleminded group? Explain.

4. From what has been said on compensation and correlation would you expect individuals of superior intelligence to be, in the main, social "dubs", "soup-faced Latin scholars" ("grinds") with poor physiques, or would you expect them to be as a group well-rounded socially and physically? Similarly, would you expect school and college athletes, as a group, to be dubs in the classroom, or Phi Beta Kappa candidates, or what? Explain.

5. Which ability, verbal, spatial, or numerical, do you think is most commonly called into play in daily life? Explain. Do tests like the spatial questions test in the text evoke more than one kind of ability? Would you expect this test to correlate more closely with a test of general ability than a test like the number series test? Explain.

6. The genius is usually characterized by such qualities as self-confi-

dence, persistence, and desire to excel, in addition to high intelligence and special talents. Have you any of these attributes, or do you know someone who has in a marked degree? Why are you not geniuses? (Or are you?)

7. From the table of sample correlations given on pages 68–69 in Woodworth and Marquis, take four of .77 or higher and try to give a plausible explanation of why they are higher than four others of .25 or less.

FIG. 7. "One more crack like that an' ya wont have yer job back after th' war." (*Copyright, 1944, United Features Syndicate, Inc.*)

8. If there were not a fairly good correlation between IQ's and academic achievement, and if there were no correspondence between occupational status and IQ's, what would you think of intelligence tests? Can they be considered primary criteria of intelligence? If not, why are they of any value?

9. Have you had any experience with aptitude tests applied to you? Have you found knowledge of the results and the attendant advice helpful? In the light of this knowledge and advice, and with your admittedly limited opportunity to act on it, do you feel that vocational advice should be definite and specific or that it should be couched in general terms? Explain.

10. The implications of the Bill Mauldin cartoon in Figure 7 were a familiar gripe to millions of men in the last war. Discuss, as calmly as you can, the nature of the correlation between civilian ability and army rank and assignments.

initial letter will be assigned by *E* just before giving the signal to start work. There will be three trials, each with a different initial letter assigned by *E*. The first trial is merely for practice and familiarization.

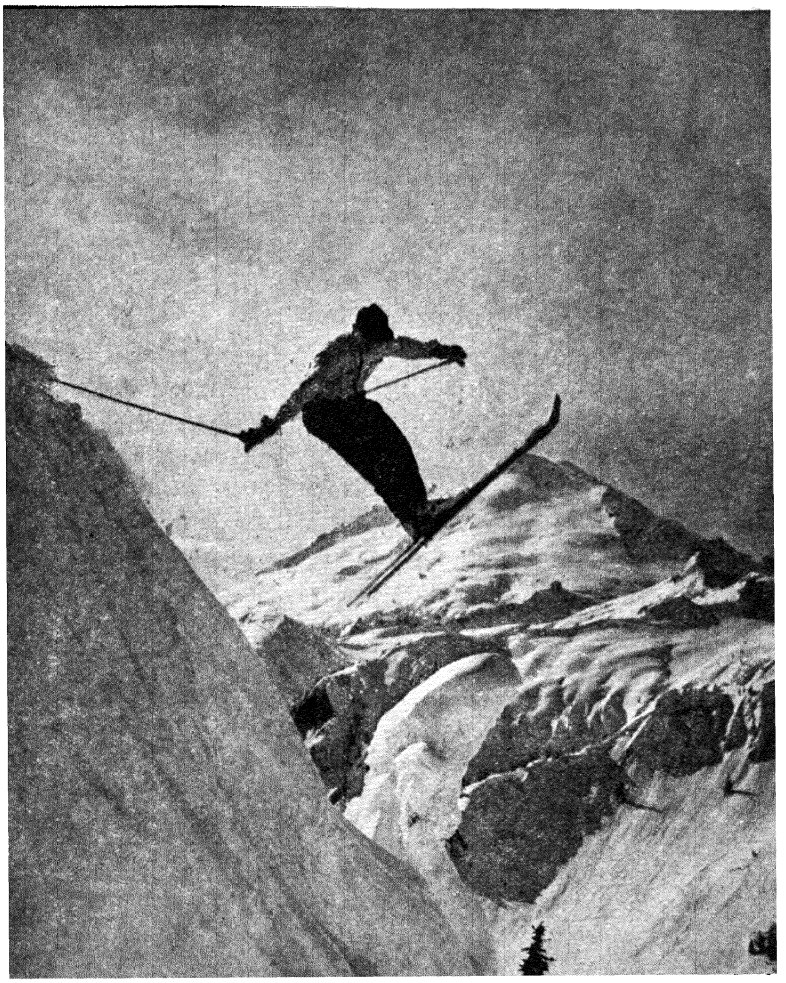


FIG. 8. Peter Garrett executes spectacular jump turn on Mount Baker. Even if you have never skied, you can't help catching your breath over this thrilling maneuver. If you have skied, you know that Garrett is under perfect control, but the valley still looks a long way off. (*Photograph by Ray Atkeson, Portland, Ore.*)

Notice the rules of this game:

All words to begin with the assigned letter.
All to be one-syllable words.
Proper names not allowed.
Singular and plural of the same word not allowed.
Words having different meanings count only once, however numerous the meanings.

After the practice trial there may be other questions to settle before starting the main trials, which will be called tests 1 and 2.

Test 3. The task is to start writing with the number 98 at a signal from *E* and count *backwards* for 20 seconds by a number which *E* will announce just before giving the starting signal.

CORRELATION CHART

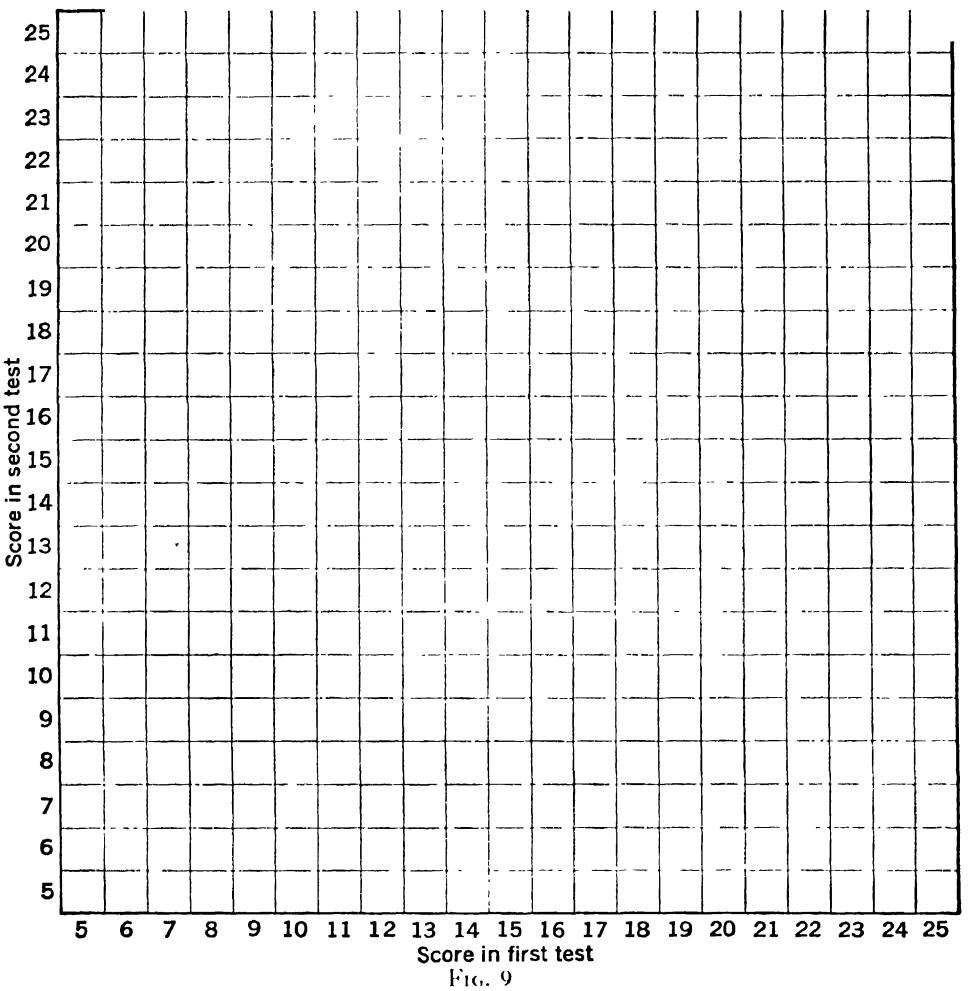


FIG. 9

Results. 1. *Correlation chart.* Each *O* counts the words in tests 1 and 2, making sure that they all conform to the rules and that no word has been repeated. The score on test 3 is the number of correct *subtractions.* Of course, an error early in the series will throw other answers off, but credit should be given for each answer which involves the correct subtraction from the answer just before it.

Now fill in the blank correlation chart. Each *O* is to place a small *x* in the square corresponding to his two scores on tests 1 and 2. If his score on the first test is 10, and the second test 14, he places an *x* in the column 10, row 14. When each *O* has located his own *x*, *E* assembles the data by advancing systematically along the rows and getting a show of hands indi-

cating how many *O*'s have their *x*'s in each successive square. The number of *O*'s falling in each square can be shown by the proper number of *x*'s.

This same procedure is to be repeated using the scores on tests 1 and 3, except that a small circle is to be substituted for the *x*. The results will be clearer if this is done on a separate chart, but one will serve if the *x*'s and circles are kept small.

2. *Rank-difference correlation* (*optional*). Using a convenient sample of the members of the class, say 20, get the rank-difference correlation between tests 1 and 2 and between tests 1 and 3, as indicated in the form below.

CALCULATION OF THE RANK-DIFFERENCE CORRELATION, RHO

O's number	Raw scores			Rank number			Difference in ranks			
	Test 1	Test 2	Test 3	Test 1	Test 2	Test 3	Tests 1 and 2		Tests 1 and 3	
							D	D^2	*D*	D^2
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

$N = 20$. $N^2 - 1 = 399$. Σ stands for "the sum of." $\Sigma D_{12}^2 =$ ——. $\Sigma D_{13}^2 =$ ——.

$$\text{Rho} = 1 - \frac{6\Sigma D^2}{N(N^2 - 1)}.$$

For tests 1 and 2

$$\text{Rho}_{12} = 1 - \frac{6 \times \quad}{20 \times 339} = 1 - \frac{1 \times}{10 \times 133} = 1 - \quad = \quad$$

For tests 1 and 3

$$\text{Rho}_{13} = 1 - \frac{6 \times}{20 \times 399} = 1 - \frac{1 \times}{10 \times 133} = 1 - \quad = \quad$$

Discussion. The scores with one initial letter may run higher than with the other in tests 1 and 2 because of unequal difficulty of the two tests. In spite of such an inequality the correlation could conceivably be perfect.

1. If a correlation were perfect, what would be true of all the individuals who had the same score in one of the two tests?

2. How would the *x*'s or the circles be arranged in the chart if either correlation were perfect?

3. How would they be arranged if the correlation were zero?

4. How would they be arranged if there were complete "compensation", or negative correlation?

5. What does the chart seem to show regarding the degree of correlation between tests 1 and 2, and between tests 1 and 3? Are these impressions supported by the rank-difference correlations?

6. Why should the correlation not be perfect between tests 1 and 2? Why would you expect a lower correlation between tests 1 and 3? Why would you expect any positive correlation between tests 1 and 3?

Name_____ Section_____ Date_____

CHAPTER THREE

OBJECTIVE EXERCISES

A. True-false and Multiple-choice Questions

( ) 1. The term *idiot savant* is used by the French to designate an authority on the feebleminded generally, not just the idiot class.

( ) 2. The feats of arithmetical prodigies are best explained in terms of an unconscious calculating process.

( ) 3. Some arithmetical prodigies can repeat after just one hearing 20 to 25 digits.

( ) 4. Most of the noted arithmetical prodigies have been at least good at higher mathematics.

( ) 5. Some eighth-graders with IQ's of as much as 115 are not able to read any better than the average third-grade child.

( ) 6. A negative correlation indicates no relationship between two tests.

( ) 7. Large negative correlations between tests of ability are more common than large positive correlations.

( ) 8. If there were a perfect positive correlation between two tests, the sum of the D^2's in the formula for Rho would be zero.

( ) 9. In ranking scores in the computation of Rho, tied scores are given the average of the ranks involved.

( ) 10. Correlations higher than .85 are seldom obtained except from the use of almost identical tests of ability.

( ) 11. If a large group of people maintain the same relative standing on many different kinds of tests of ability, this suggests: (1) group factors in ability, (2) many special abilities, (3) general ability, (4) the two-factor theory.

( ) 12. The theory that ability can be explained in terms of a single general factor is outmoded.

( ) 13. The two-factor theory of ability is inadequate to explain the observed correlations.

( ) 14. The evidence for group factors includes relatively high correlations between tests within each group and lower correlations between the tests from different groups.

( ) 15. There is evidence indicating group factors for verbal, numerical, spatial, artistic, musical, and mechanical abilities.

( ) 16. The group factor of verbal ability is based primarily on fluency in speech and reading.

( ) 17. Verbal ability is broader in scope than numerical ability.

( ) 18. We should expect a high correlation between tests of speed in the four fundamental arithmetical operations and difficult arithmetical problem tests.

( ) 19. Spatial ability as usually tested is quite distinct from verbal ability.

( ) 20. Experts now agree that the facts of correlation point convincingly to a general ability in addition to specific and group abilities.

( ) 21. Thorndike believes that general ability is based on ability to learn and retain; Spearman believes it depends on the ability to grasp relationships.

( ) 22. The theories of Thorndike and Spearman on the nature of general ability may amount to the same thing.

B. Matching Exercises

Answers: (1) employees (2) validity (3) euphoria (4) intelligence (5) aptitude (6) battery (7) correlation (8) statistics (9) reliability (10) aboulia (11) criterion.

( ) 23. The correspondence between ... . test scores and academic achievement is less close in college than in elementary school.

( ) 24. In predicting success in particular lines of work we often make use of ..... tests.

( ) 25. The self-correlation of a test is used as a measure of its .....

( ) 26. When a test is a good indicator of the performance it is designed to predict, it is said to have .....

( ) 27. A test must show a good correlation with the ..... in order to have validity.

( ) 28. On the whole, there is good .... between children's IQ's and school success.

( ) 29. Eighteen tests were combined into a .... to predict success in pilot training

( ) 30. Some of the same techniques used in selecting ..... are useful in vocational guidance.

CHAPTER FOUR

Personality

He leaves for American history . . . the greatest, best, most characteristic, artistic, moral personality. — Walt Whitman

QUESTIONS FOR DISCUSSION

A. Text Questions

1. Tell what is meant by personality, with special reference to its relation to character, to traits, to social situations, and to the permanent characteristics of the individual. Illustrate wherever possible.

2. Why is it better to speak of "dimensions of personality" rather than of "personality traits and their opposites"? What bearing does this have on the concept of types?

3. How does the correlation technique aid in the study of personality traits? Mention several trait clusters.

4. Describe briefly Jung's introversion-extroversion concept. Is there any correlation between this dimension and intelligence? Is there any overlapping between this and any other fairly well established personality dimension or trait cluster?

5. What are the relative advantages and disadvantages of the interview and the rating scale?

6. What is the difference between the "generosity error" and the "halo effect"? Does the pooling of ratings from different judges eliminate either of these?

7. Discuss briefly the vocational interest questionnaire. Why is it superior to a simple direct question on vocational preference? Comment on the reliability and validity of personality questionnaires in general.

8. What is meant by a situation test? Illustrate. What advantages has it over the interview or the paper and pencil test?

9. What is meant by a projective test? Illustrate. Comment briefly.

10. Jack Black, an accomplished ex-burglar and the author of *You Can't Win*, has stated authoritatively that "honor among thieves" is a reality. Lincoln Steffens in his autobiography makes it clear that there is also honor among politicians. How do these conclusions relate to the studies of honesty among children?

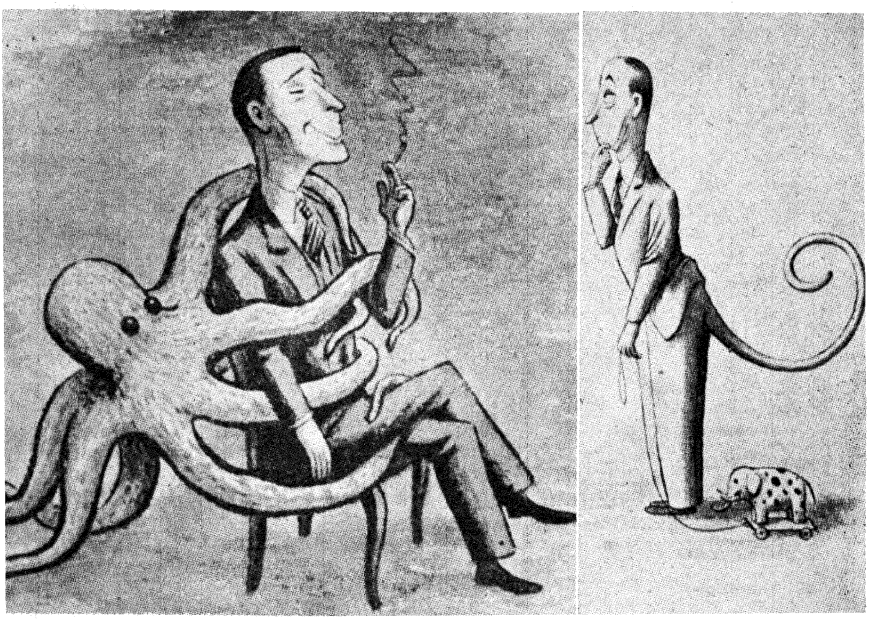
The Split Personality

From It's a Long Way to Heaven, *copyright 1945 by Abner Dean, and reproduced by permission of Rinehart & Co., publishers.*

FIG. 10.

Do you find these two tendencies in yourself or in any of your friends? Does this constitute a "double personality"? Explain.

4. Consider Figure 10. Abner Dean has produced an almost photographic likeness of "The Unconscious," at least that of some people. Though it was published twenty-five years after the jingle from *Punch* in the question above, it is the perfect illustration for it. Is the contrast between the two opposite tendencies in the personality portrayed here as extreme in most people? Why is it so great in some?



"Poise.' The "poise" is only a pose. Actually the man is rigid due to a deadlock of forces within him, represented by the octopus.

"Man who feels he is imposing." Ruefully aware of his shortcomings.

FIG. 11. Personality caricatures from *About People* by William Steig. (*Reprinted by permission of Random House, Inc., New York. Copyright, 1939, by Random House, Inc.*)

5. How would you characterize the dimension of personality suggested by the two Steig caricatures in Figure 11? Is this an important dimension, would you say? Is it similar to any of the dimensions suggested in the text? Where should one be located with respect to this dimension? Where do you stand in this respect? What can be done about it? Does it help just to look at these caricatures? Why?

C. Special Questions

1. Beethoven is said originally to have dedicated his "*Eroica*" *Symphony* to Napoleon. Heine's poem *The Two Grenadiers*, set to music by Schumann, is one of the most stirring songs ever written. This too was in-

spired by Napoleon. What was there about "the little French corporal" that so fired the imaginations of these three great Germans?

2. What, to you, were the outstanding characteristics of the personality of Franklin D. Roosevelt? Where did he stand on the introversion-extroversion dimension? On the ascendance-submission dimension? How did he compare with Wilson and Theodore Roosevelt with respect to introversion-extroversion?

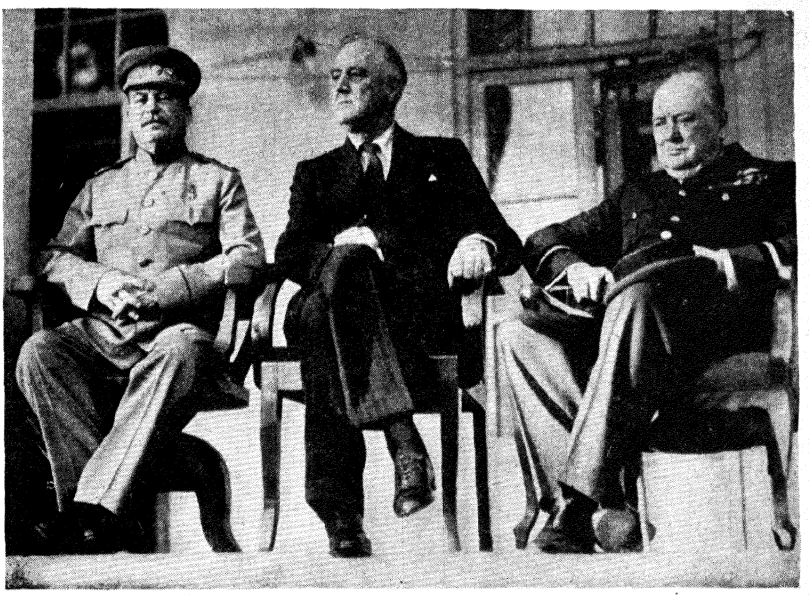


FIG. 12. Stalin, Roosevelt, and Churchill at Teheran. (*Press Association Photo.*)

FIG. 12. Stalin, Roosevelt, and Churchill at Teheran. (*Press Association Photo.*)

3. Samuel Johnson was in many respects a "queer duck." He was, says Macaulay, "of an unsound body and an unsound mind. — His grimaces, his gestures, his mutterings, sometimes diverted and sometimes terrified people who did not know him. At a dinner table he would, in a fit of absence, stoop down and twitch off a lady's shoe. He would amaze a drawing room by suddenly ejaculating a clause of the Lord's Prayer." Though not a great writer, he was the rallying point for a remarkable assortment of brilliant men, including Oliver Goldsmith, Edmund Burke, Sir Joshua Reynolds, Edward Gibbons, and David Garrick. How do you explain his power of attraction?

4. What do you regard as common to the personalities of Roosevelt, Churchill, and Stalin? In what respects do they differ? Do their pictures reveal much of their personalities (see Figure 12), or are they, for the most part, poses intended for popular consumption?

5. Burton in his *Anatomy of Melancholy* says of Hannibal: "As he had mighty virtues, so he had many vices; he had two distinct persons in him."

Do you think his record would justify the diagnosis of a split personality? Explain.

6. Do you consider Hamlet an introvert, an extrovert, or an ambivert? Explain.

7. Do you consider Stevenson's *Dr. Jekyll and Mr. Hyde* pure phantasy, or is there something in this story that touches real life?

8. To whom was Walt Whitman referring in the quotation at the beginning of this chapter? For whom do you think the quotation most appropriate? Why?

A PERSONALITY INVENTORY

Purpose. To study a typical questionnaire test for measuring an important dimension of personality.

Materials. Any standard personality inventory, such as the Bernreuter Personality Inventory, the California Test of Personality (Adult Form), or the Woodworth Personal Data Sheet, a curtailed version of which appears below. (The discussion below and the questions which follow it are appropriate, with only slight modifications, to the first two of these questionnaires, as well as to the Woodworth.) The Woodworth inventory was a pioneer in this field. It was designed during World War I as an aid in selecting men most likely to withstand the emotional rigors of modern warfare. Its fundamental principle and many of its items appear in a dozen or more other tests now in common use.

The 42 items here reproduced were selected from the original list of over 100 by Garrett and Schneck [1] because of their power to differentiate between a group of psychoneurotics and a group of Columbia College freshmen used as controls. The 25 items marked with asterisks differentiated more sharply than the others.

Procedure. 1. *Directions.* For each question on the Personal Data Sheet put a circle around the answer which fits you best. You will have time to consider each question carefully before answering, but don't waste your time.

Woodworth Personal Data Sheet
(Curtailed by Garrett and Schneck)

YES NO *1. Do you usually feel well and strong?
YES NO *2. Do you usually sleep well?
YES NO *3. Are you often frightened in the middle of the night?
YES NO 4. Do you have the sensation of falling when going to sleep?
YES NO 5. Does your heart ever thump in your ears so that you cannot sleep?

[1] Garrett, H. E., Schneck, M. R., A study of the discrimination value of the Woodworth Personal Data Sheet, *J. Gener. Psychol.*, *1*, 1928, 459–471.

YES NO 6. Do ideas run through your head so that you cannot sleep?
YES NO *7. Do you feel well rested in the morning?
YES NO *8. Do your eyes often hurt you?
YES NO *9. Do things ever seem to swim or get misty before your eyes?
YES NO *10. Are you bothered by fluttering of the heart?
YES NO *11. Do you feel tired most of the time?
YES NO *12. Have you ever had fits of dizziness?
YES NO *13. Do you have queer unpleasant feelings in any part of your body?
YES NO *14. Do you ever feel an awful pressure in or about your head?
YES NO *15. Do you often have bad pains in any part of your body?
YES NO *16. Do you have a great many bad headaches?
YES NO *17. Is your head apt to ache on one side?
YES NO *18. Have you ever fainted away?
YES NO *19. Have you ever been blind, half-blind, deaf, or dumb for a time?
YES NO *20. Have you ever lost your memory for a time?
YES NO *21. Did you ever run away from home?
YES NO 22. Did you ever have a strong desire to run away from home?
YES NO *23. Do you think tobacco has hurt you?
YES NO 24. Have you ever had any great mental shock?
YES NO 25. Do you ever have a queer feeling as if you were not your old self?
YES NO *26. Does it make you uneasy to go into a tunnel or subway?
YES NO 27. Do you usually know what you want to do next?
YES NO 28. Do you think you worry too much when you have an unfinished job on your hands?
YES NO 29. Can you do good work while people are looking on?
YES NO 30. Do you get rattled easily?
YES NO 31. Can you sit still without fidgeting?
YES NO *32. Did you ever have the habit of stuttering?
YES NO *33. Did you ever have the habit of twitching your face, neck, or shoulders?
YES NO 34. Is it easy to make you laugh?
YES NO 35. Is it easy to get you angry?
YES NO 36. Is it easy to get you cross or grouchy?
YES NO 37. Do your interests change frequently?
YES NO *38. Did you ever have convulsions?
YES NO *39. Did you ever have a nervous breakdown?
YES NO 40. Can you stand pain quietly?
YES NO 41. Can you stand the sight of blood?
YES NO *42. Can you stand disgusting smells?

2. *Scoring.* (a) Put a mark in the left-hand margin beside each of the following items for which you have circled the YES: 3 through 6, 8 through 26, 28, 30, 32, 33, 35 through 39. (b) Put a mark beside each of the following items for which you have circled the NO: 1, 2, 7, 27, 29, 31, 34, 40, 41, 42. (c) The total number of these marks is your *general score.* (d) The number of these marks beside the items marked with an asterisk is your *special score.*

3. *Computation.* Get the class average for both the general scores and the special scores and enter them in the table below. If your instructor so directs, calculate the σ's (standard deviations) as well.

	Your Class Results	*Garrett and Schneck's Results*	
		Columbia Freshmen	*Male Psychoneurotics*
No. of subjects (N):	.....	103	256
General average:	.....	6.8	11.7
General σ.:	.....	4.0	8.5
Special average:	.....	2.7	7.5
Special σ.:	.....	2.4	5.5

Discussion. 1. *Significance of the scores.* The items on this test are based on "symptoms," many of them minor symptoms, which appear a little more often among psychoneurotics than among better adjusted people. Garrett and Schneck found that some of these symptoms were present in as few as 20 percent of their psychoneurotic sample. Some of the symptoms, even in the special list of 25 items, were only 10 percent more common among the psychoneurotic group than among the control group and a few of the items were even a little more frequent in the group assumed to be normal than in the psychoneurotic group. Yet the 42 items (and still more the special 25) did differentiate between the normal group *taken as a whole* and the psychoneurotic group *taken as a whole.*[3] But note the big individual differences within each group, as indicated by the σ's. The two score distributions overlap conspicuously. Many subjects in the control group have scores higher than the average of the psychoneurotic group, and many subjects in the psychoneurotic group have scores lower than the average of the control group. In other words, though the test has a demonstrated validity in distinguishing between groups, *we must not assume that a high individual score is a proof of neuroticism or that a low score is a guarantee of emotional adjustment.* Very high or low scores merely indicate *probable* tendencies which need to be verified by other more searching techniques. Some of the personal variables that reduce the dependability of individual scores on tests of this sort are suggested in the questions that follow.

2. Could the unscrupulous person who wanted to give a false impression tell, in general, which answers are symptomatic in this test? Can we usually

[3] The critical ratio (based on σ's) was 7.4 for the 42 items and 12.8 for the 25 more significant items.

do any more than assume good faith on the part of the subjects in any personal questionnaire test?

3. Do you think it likely that there will be some variation in the interpretation of qualifying words in this and similar tests? Illustrate.

4. Do you think that the answers to some of these questions might vary with a change in the subject's mood or general condition? Explain. Is neuroticism usually a permanent condition of the individual?

5. Can you think of any other sources of error in a test of this sort? Illustrate.

6. Can you explain why there should be so many items dealing with physical symptoms on a psychoneurotic inventory? Can we really separate mind and body? What is the meaning of "hysterical symptoms"?

7. Explain how a test may have validity for distinguishing between groups and yet may not always make valid distinctions between individuals.

8. (Optional question.) Garrett and Schneck have already checked the validity of this test in one way. How would you check its reliability?

Name_____ Section_____ Date_____

CHAPTER FOUR

OBJECTIVE EXERCISES

A. True-false and Multiple-choice Questions

( ) 1. We must distinguish clearly between character and personality.

( ) 2. Personality is, broadly, the total quality of an individual's behavior.

( ) 3. Psychologists find that the submissive individual has a much better chance than the aggressive person of achieving a happy marriage.

( ) 4. Personality is a relatively permanent characteristic of the individual, which reveals itself only in social situations.

( ) 5. The concept of "dimensions of personality" should help us to avoid the type fallacy.

( ) 6. Trait clusters are characterized by high correlations between the traits involved.

( ) 7. Valuative traits are among the most fundamental personality traits.

( ) 8. Which one of the following is most valuable in judging personality: (1) astrology (2) forehead (3) the nose (4) the chin (5) facial expression?

( ) 9. Interviewing is an essentially scientific procedure for judging personality.

( ) 10. Which one of the following would Jung regard as more characteristic of the introvert than the extrovert: (1) lives in the present (2) values social success (3) practical (4) thoughtful (5) makes quick decisions?

( ) 11. It is possible to distinguish between intellectual introversion-extroversion and social introversion-extroversion.

( ) 12. The interest questionnaire is superior to the direct question in that it yields a measure of the relative strength of interests.

( ) 13. Situation tests involved practical problems and conditions of stress designed to test initiative, emotional stability, and responsiveness to orders.

( ) 14. It is generally easier to devise valid tests of ability than valid tests of personality.

( ) 15. Pick out the one item which is *least* like the others: (1) inkblot test (2) red herring test (3) Rorschach test (4) projective test.

( ) 16. Almost no one shows any particular trait with perfect uniformity.

( ) 17. Traits such as conscientiousness, realistic outlook, frankness, and instability show less consistency and generality than such traits as promptness and rudeness.

( ) 18. Which of the following correlations between "cheating scores" was highest: (1) schoolroom test with schoolroom test (2) gymnasium test with gymnasium test (3) schoolroom test with gymnasium test?

( ) 19. Honesty was shown to be dependent on the group code as well as upon the individual.

( ) 20. The most honest children as a group had high intelligence, good homes in good neighborhoods, and good emotional adjustment.

( ) 21. A child who cheats in one situation and not in another cannot be said to show self-consistency.

( ) 22. The change of a single trait in a pattern of several traits can make the total personality seem very different.

B. Matching Exercises

Answers: (1) some value (2) disintegration (3) group code (4) negative correlation (5) total quality (6) no advantage (7) positive correlation (8) "halo effect" (9) "sisu" (10) characteristic (11) self-consistency.

( ) 23. We may define personality as the . . . . . of the individual's behavior.

( ) 24. The personality of the individual is a relatively permanent . . . . . .

( ) 25. If the judges have the same bias there is . . . . . in pooling their personality ratings.

( ) 26. It has been shown that honesty is dependent quite as much upon the . . . . . as upon the individual.

( ) 27. If a child cheats in the classroom but not in the gymnasium, he may still be acting with . . . . . .

( ) 28. Honesty and intelligence show a . . . . . .

( ) 29. In rating a person on several traits we must guard against the . . . . . .

( ) 30. In cases of multiple personality . . . . . appears with dramatic vividness.

CHAPTER FIVE

Physiological and Social Factors in Personality

How different is the same man from himself, as he assumes the personality of a magistrate and that of a friend! — South[1]

QUESTIONS FOR DISCUSSION

A. Text Questions

1. Cite some examples of temporary modifications of personality which result from low blood sugar, dietary deficiencies and the use of sedative drugs. In what two ways may disease affect personality?
2. What has iodine to do with personality? Is there any connection between myxedema, cretinism, goiter, and geography? Explain. Is any such connection with geography necessary today? Explain.
3. Criticize the statement: The parathyroids bear the same relation to the thyroids that the adrenal medulla bears to the sympathetic nervous system.
4. In what respects is the function of the sympathetic nervous system similar to that of the adrenal medulla? Mention two ways in which their reactions differ.
5. Explain the statement: myxedema is related to cretinism in the same way that acromegaly is related to giantism.
6. Name four endocrine glands that may influence sex development, stating the nature of the influence in each case. (See Figure 13.)
7. What is known as the "master gland" of the body? Why?
8. Give two reasons why it is difficult to diagnose endocrine disturbances from a study of external behavior alone. Illustrate.
9. Illustrate the influence of the group code on personality by reference to an isolated Blue Ridge Mountain community or to a neighborhood gang. Is it possible to resist such social pressures? Illustrate.
10. Illustrate the stages children commonly go through in learning the rules of the game, or in acquiring the social code with respect to lying.

[1] Slightly modified.

11. Comment briefly on Adler's views on the relationship between birth order and "style of life."

12. Discuss the Freudian concept of identification. Illustrate. Mention one emphasis common to the theories of Freud and Adler. Criticize briefly.

13. Discuss the relative merits of ascendance and submissiveness as personality traits. Summarize briefly an experiment or two in training for ascendance.

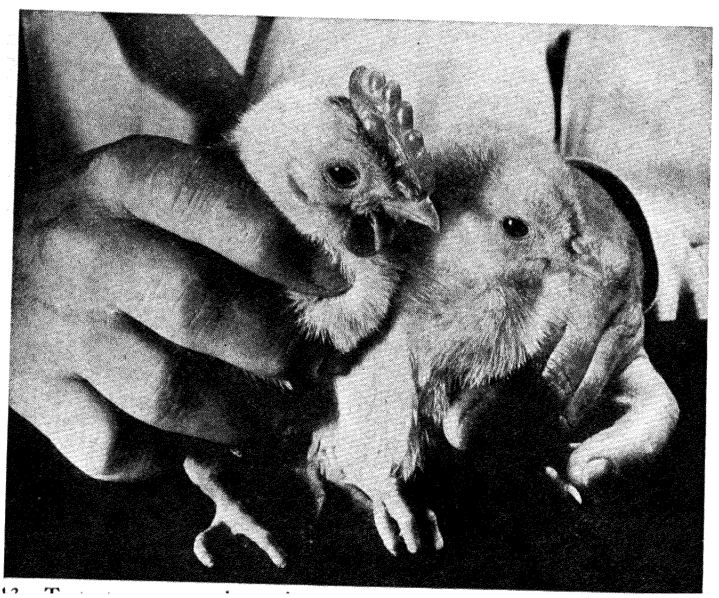


FIG. 13. Testosterone, a male sex hormone, injected in chicks makes them grow combs and crow like roosters. (Life Magazine.)

14. Comment briefly on the interplay of biological and social factors in the personality. What, briefly, is the relationship between multiple social roles and multiple personality?

15. How is continuity of personality brought out in the biographical sketch of Mark Twain?

B. General Questions

1. Napoleon's "chemique" was more impressive than his "physique." Which of these aspects of personality impresses you more in Churchill, Hitler, Stalin, Lincoln, Joe Louis, and Jimmy Durante? Is it safe to generalize and say that one is more important than the other?

2. Turn to the somewhat larger female figure in Figure 17. Is this primarily the result of chemique, or is it a role which she has adopted?

3. A politician has been defined as "one who gets campaign contributions from the rich and votes from the poor on the pretext of protecting each from the other." Does your speech, style of dressing, or manner of

behavior change with the social setting; when in Rome do you do as the Romans do? Illustrate. Does this make you a politician? Is this a matter of suggestibility, egotism, consideration for the feelings of others, or what?

4. Refer to the picture of Victor Emmanuel in Figure 17. Here we have a splendid illustration of the influence of roles and codes. Notice the brave determination with which the king is trying to live up to his role. The officers on the right are visitors from Nazi Germany. One can almost detect a trace of condescension in their faces as they carry out their role. How do you think the behavior of the actors in this drama would change in a state of nature, without the compulsion of the code?

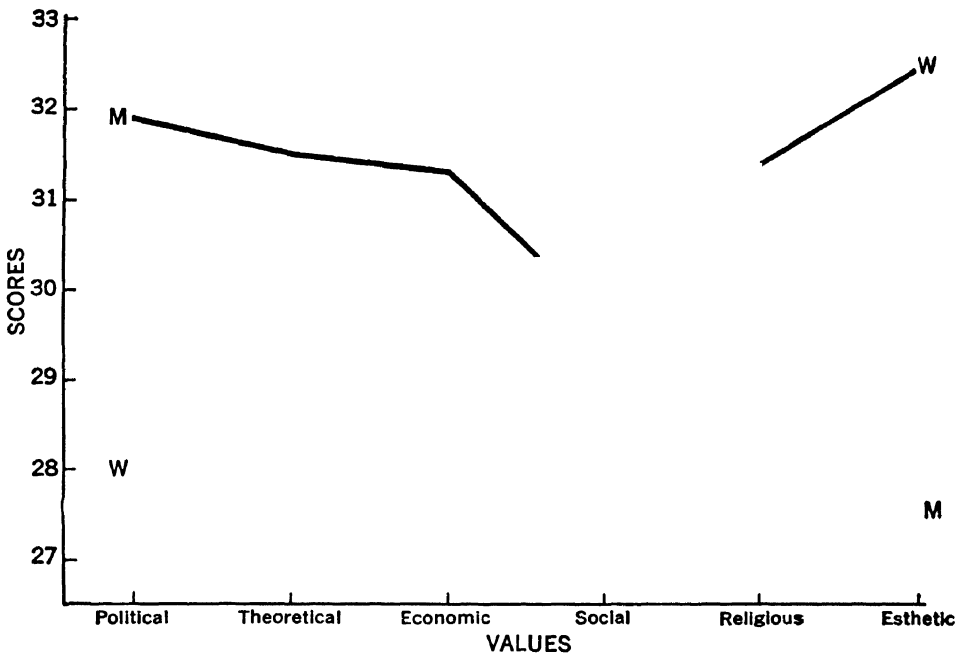


FIG. 14. Sex differences in values or interests. Each point on the graphs represents the average score for several hundred college men or women on one of six "values." As measured by this test, men on the average are more interested in political, theoretical, and economic matters; while women on the average are more interested in social, religious, and esthetic matters. (*Data from* A Study of Values *by G. W. Allport and P. E. Vernon.*)

5. Can you recall a situation from your own experience, or in that of some acquaintance, in which the individual largely "made his own role"? Another in which the "role molded the individual" appreciably? Another in which interaction is conspicuous? Illustrate.

6. Why should the individual often find a more congenial role in the gang than in the home? Do the adventurous activities of the gang appeal solely because of the physical excitement involved, or do they somehow contribute to the individual's sense of self-importance? What about sports which are sometimes hazardous, like football, white-water canoeing, skiing, mountain climbing (see Figure 3)? Is the individual so likely to take risks if he has a self-satisfying role in less adventurous activities? Or is engaging

in mild adventure justified by its power to recreate the individual for more useful pursuits? Is there some other explanation?

7. Peter Freuchen in his *Arctic Adventure* describes an amusing incident which illustrates the childish faith in authority shown by the Eskimos of northern Greenland. On the occasion of their first public election the vil-

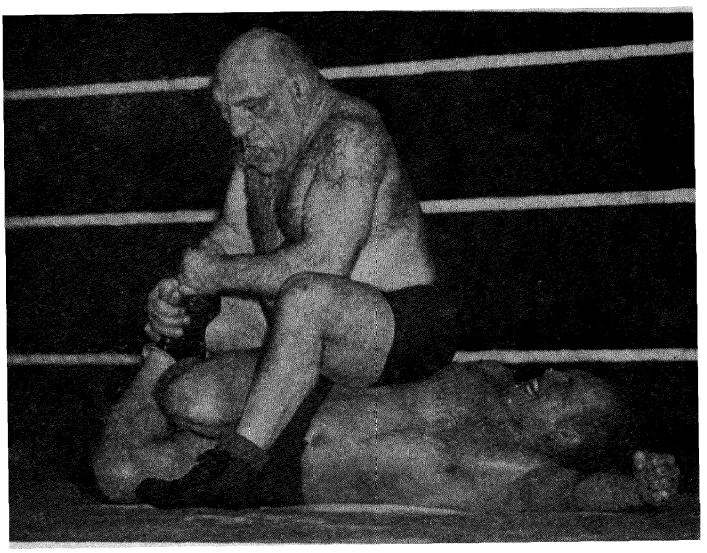


FIG. 15. A very unusual case of acromegaly. Maurice ("The Angel") Tillet, 275-pound French wrestler, whose appearance has been compared with that of the primitive Neanderthal man of 50,000 years ago. Unlike most victims of acromegaly, who are physically weak, "The Angel" is the most powerful man American anthropologists have seen. Although only 5 feet 8½ inches tall, he has a 47-inch chest and is all muscle. M. Tillet is intelligent, unassuming, and (outside of the wrestling arena) courteous and friendly. (*Pictures, Inc.*)

lagers had been instructed to vote by secret ballot. Although there was only one candidate, they solemnly filed into the igloo, one by one, and cast their votes. When after two hours of patient waiting they were forced to enter the polling place to check up on one of their number who had fallen asleep in the process, they felt it necessary to repeat the entire ceremony because they had violated the secrecy of the ballot. This seems silly to us, but can we be sure that we in our culture are never guilty of subservience to some equally meaningless ritual? Can you think of an example?

8. Do the slight average differences in interests between the sexes suggested in Figure 14 conform to your own impressions in these matters? Do you observe big individual differences in interests within each of the groups compared? Assuming that the figure gives a fairly accurate picture, how do you explain it? Does society assign different roles to the two sexes, or do natural differences between the sexes make some such interest differences inevitable, or both? What factors could plausibly be assumed to contribute to the particular differences indicated?

9. Do you think that the subservience to taboo and ritual among primitive people has a "civilized" counterpart in the insistence on up-to-the-minute fashions and on such practices as the gentleman always walking on the outer side of the walk when in the company of a lady? Discuss. Do you think there is a danger that the fashionable individual, the one who prides himself on always being "correct," will not only be clad in woolen garments of standard cut, but will become "sheep-minded" as well? Discuss.

10. Why do we care whether or not a person shows continuity of personality: (a) from his point of view, (b) from ours? If there were a complete absence of continuity of personality in everyone, would personality have any meaning?

11. Examine Figure 15. To what glandular condition is acromegaly due? What characteristic symptoms does "The Angel" show? In what ways do you think M. Tillet has had to work to keep his personality well adjusted?

C. Special Questions

1. Have you ever run across a person who seemed to "cooperate with the inevitable"? Is this tendency more common among orientals or occidentals? Does it indicate a perfectly adjusted personality? Is it a desirable trait or not?

2. Do you think that "chemique," defined broadly so as to include the influence of disease, had any special significance in the career of Robert Louis Stevenson? Can you think of other similar cases?

3. Illustrate from the biography of some great figure essential continuity of personality in spite of some drastic change in circumstances resulting from disease or other misfortune.

4. Give one or more illustrations from biography of what appear to be Freudian or Adlerian mechanisms at work. What about Napoleon? Hitler?

5. Give one or more illustrations from biography of historical events apparently "forcing" the role of leadership on the individual.

6. Give one or more illustrations from biography of the sweeping aside of old codes and the establishing of new. Are great men more likely to sweep aside codes than little men? Does the habit of sweeping aside codes in itself indicate greatness?

FILM

Dominance Behavior in Rats

Dr. Frank Beach, of the American Museum of Natural History, has skillfully produced and photographed a film [2] which neatly illustrates the

[2] *Competitive Behavior in the Rat.* Silent. Dr. Frank A. Beach, American Museum of Natural History. New York City. Length, 200 ft. Price, $20.00.

influence of social factors in the development of dominance behavior in rats, an acquired "personality trait" which is only semipermanent in this species. As soon as you have seen the film mark the following statements with a + for true and a − for false or partly false.

( ) 1. Competition for the dry spot in the tank persisted after 10 days.

( ) 2. One rat became clearly dominant over the other in the tank.

( ) 3. In the food situation only one rat could get food at a time.

( ) 4. Rat #3 (hair clipped in rear), who had previously competed successfully for food, was easily victorious over #1 (black), who was relatively inexperienced in the food situation.

( ) 5. Rat #1, when tested with a fourth rat who had never been successful in the food situation, pulled his new rival away from the food repeatedly without being attacked.

( ) 6. Rat #1 could then compete successfully with #2 (his former rival in the tank) but never succeeded in dominating #3 (his former superior in the food situation).

( ) 7. Rat #1 after several successful attacks in the food situation became so aggressive that he attacked his rival even though no food was present.

( ) 8. Like some species of birds, reptiles, and mammals, rats establish and maintain dominance hierarchies.

( ) 9. In competitive situations dominance frequently does not appear until actual fighting occurs.

( ) 10. Fighting usually results in dominance, which often spreads to noncompetitive situations.

(Scoring key is given in *Notes for Instructors.*)

A PERSONALITY RATING SCALE

Purpose. To study a typical personality rating scale; and to compare the ratings of friends, casual acquaintances, and self-raters.

Materials. The five parts of the graphic rating scale below, devised by the American Council on Education, have been labeled to simplify our discussion. *C* stands for *charm*, *I* for *initiative*, *L* for *leadership*, *E B* for *emotional balance*, and *P* for *purpose*. The points on the scale have been numbered in order to facilitate the comparison of ratings; the larger numbers indicate the more desirable ratings in every case.

American Council on Education Personality-rating Scale
(Slightly modified)

C. How does his appearance and manner affect others?	0	1	2	3	4	5	6	7	8	9	10
	Avoided by others		Tolerated by others		Unnoticed by others			Well liked by others		Sought by others	
I. Does he need constant prodding or does he go ahead with his work by himself?	0	1	2	3	4	5	6	7	8	9	10
	Needs much prodding in ordinary assignments		Needs occasional prodding		Does ordinary work of own accord			Completes suggested supplementary work		Seeks and sets for himself additional tasks	
L. Does he get others to do what he wishes?	0	1	2	3	4	5	6	7	8	9	10
	Probably unable to lead his fellows		Satisfied to have others take lead		Sometimes leads in minor affairs			Sometimes leads in important affairs		Displays marked ability to lead	
E B. How does he control his emotions?	0	1	2	3	4	5	6	7	8	9	10
	Too easily moved to anger or depression		Tends to be over-emotional		Usually well balanced			Well balanced		Unusual balance of responsiveness and control	
	0	1	2	3	4						
	Unresponsive, apathetic		Tends to be unresponsive								
P. Has he a program with definite purposes in terms of which he distributes his time?	0	1	2	3	4	5	6	7	8	9	10
	Aimless trifler		Aims just to "get by"		Has vaguely formed objectives			Directs energies effectively with fairly definite program		Engrossed in realizing well-formulated objectives	

Procedure. 1. *Selection.* The class selects *by voting* two of its members to be rated by everyone. For *each* of these subjects two members of the class who feel that they know them best are designated "friends."

2. *Rating.* The two subjects are rated on all five parts of the scale by everyone in the class, including themselves.

3. *Computation.* (a) For each of the subjects, O_1 and O_2, pool the ratings of the two friends (i.e., average them) on each of the five traits and enter the results in the table. Work out the other averages suggested by the table. (b) For each of the subjects pool the ratings of the class, *excluding* the ratings of the friends and the subjects themselves. (This process may be simplified by averaging the ratings of a sample of 5 or 10 judges only, selected at random.) Enter the results in the table and work out the other averages suggested. (c) Enter the self-ratings and work out the suggested averages.

Traits	Pooled ratings by others						Self-ratings		
	Friends			Class					
	O_1	O_2	Average for 2 O's	O_1	O_2	Average for 2 O's	O_1	O_2	Average for 2 O's
Charm									
Initiative									
Leadership									
Emotional Balance									
Purpose									
Average of 5 traits									
Average of traits C and L									

Discussion. 1. From a study of the table of results can you find any evidence which suggests the "generosity error"; for example, do the friends of either or both of the subjects rate them higher on the average than the casual acquaintances do? Can we be *sure* that a high rating by a friend is less accurate than a lower rating by the group? Explain.

2. On which two of the five traits would you expect the group to be most nearly qualified to judge the casual acquaintance? Explain. Does a comparison of the ratings of the two groups based on these two traits reveal anything not brought out by the comparison based on all five traits?

3. On which trait do you feel that you personally were best qualified to judge the subjects? Is there anything in your introspections, your results, or the class results which suggests the "halo effect"? Explain.

4. Is there any evidence that the self-raters have been too generous to themselves, or too harsh? Explain.

Supplementary Exercise

Correlations Between Rating Scale and Personality Inventory Results

Let every member of the class rate himself on the American Council scale. Then get the rank-difference correlations for the class between the scores on the personality inventory (measuring adjustment) used in Chapter 4 and each of the following: (a) *total* scores for all five traits, and (b) scores on trait *E B*. Would you expect positive or negative correlations? Explain. Which of the two correlations would you expect to be higher? Explain. How would you explain very low correlations? Would the validity and the reliability of the tests be involved? Explain.

Name_____ Section_____ Date_____

CHAPTER FIVE

OBJECTIVE EXERCISES

A. True-false and Multiple-choice Questions

( ) 1. Both the nervous system and the circulatory system act as integrators of the organism.

( ) 2. About how long does it take for a substance delivered into the bloodstream by one organ to reach all the organs: (1) 1 sec. (2) 15 sec. (3) 30 sec. (4) 1 min. (5) 15 min.?

( ) 3. An endocrine gland is one that delivers its product into the bloodstream.

( ) 4. An excess of the hormone insulin causes sugar to accumulate in the blood, which in large amounts may produce acute mental distress.

( ) 5. Myxedema is due to a deficiency of thyroxin, cretinism to an excess.

( ) 6. We should expect an iodine deficiency in the diet to lower the basal metabolism.

( ) 7. Overactivity of the thyroid during the growth period causes an increase in general activity and irritability and an acceleration in physical and mental growth.

( ) 8. Which one of the following is *not* present in Addison's disease: (1) destruction of adrenal cortex (2) low basal metabolism (3) lassitude (4) increased sexual excitability (5) increased susceptibility to infectious disease?

( ) 9. Some of the hormones secreted by the primary sex organs are present in *both* males and females.

( ) 10. All of the following appear to be influenced by hormones in subhuman female mammals: the estral cycle, pregnancy, lactation, and the urge to give maternal care to the young.

( ) 11. Giants, midgets, and acromegaly are all due to some abnormality of what gland: (1) thyroid (2) gonad (3) adrenal (4) pituitary (5) pancreas?

( ) 12. An expert endocrinologist can diagnose a disorder in a specific gland from a careful study of the patient's behavior alone.

( ) 13. Both physiological and social factors should be considered when seeking causes of neuroses and insanity.

( ) 14. In learning the rules of the game of marbles and in acquiring a social code with respect to lying the Swiss children pro-

gressed from the no-rule stage, through the authoritarian stage, to the utilitarian stage.

( ) 15. Personality is the individual's response to the role imposed upon him by the group code.

( ) 16. Since oversolicitude often produces personality difficulties in the child, behavior clinics recommend strict discipline between the ages of three and ten years.

( ) 17. Recent investigators have given substantial support to Adler's theories regarding birth order.

( ) 18. There is value in the concept of identification, though we need not accept Freud's theory of its origin.

( ) 19. Freud and Adler agree that the experiences of adolescence are the most fundamental determiners of the individual's role in life.

( ) 20. The child often finds a more congenial role in the play group or the gang than in the home.

( ) 21. It has been experimentally demonstrated that ascendance scores can be increased by training.

( ) 22. It has been shown that judicious placement in foster homes can improve nearly 90 percent of children subject to such difficulties as stealing, lying, running away, timidity, distrust, irritability, and precocious sex interest, except when the personality shows distinctly abnormal trends.

B. Matching Exercises

Answers: (1) pituitary (2) constitution (3) continuity (4) adrenal (5) interaction (6) integrator (7) thyroid (8) oxygen (9) secretion (10) nitrogen (11) pancreas.

( ) 23. Personality, both normal and neurotic, involves . . . . of biological and social factors.

( ) 24. Two individuals playing practically the same role will play it differently because of their different internal . . . .

( ) 25. There is much in Mark Twain's biography to suggest the . . . . of his personality.

( ) 26. The bloodstream is the chemical . . . . of the organism.

( ) 27. An endocrine gland is a gland of internal . . .

( ) 28. Goiter is a disorder of the . . . . . .

( ) 29. The basal metabolism is a measure of the rate of consuming . . . . . .

( ) 30. The . . . . . is known as the "master gland."

CHAPTER SIX

Heredity and Environment as Causes of Individual Differences

To each is given a certain inward talent, a certain outward environment of Fortune; to each, by wisest combination of these two, a certain maximum of capability. — Carlyle

QUESTIONS FOR DISCUSSION

A. Text Questions

1. Why is it absurd, in attempting to explain the development and behavior of an individual, to ask, "Which is more important, heredity or environment?" Under what circumstances does this become a meaningful question?

2. What are the implications of the statement that the individual is the product of his heredity and environment? Illustrate by means of a simple analogy.

3. How do hybrids and monsters illustrate the importance of heredity and environment in the production of individual differences?

4. What is meant by the term "effective environment"? Under what circumstances does the same environment make people differ? Under what circumstances does environment make people more alike?

5. Discuss the transmission of heredity through the chromosome pairs. What is meant by *alternative genes?*

6. What are the principle reasons for similarities and differences in IQ's within the family? What has "homogamy" to do with these matters? What about monogamy? What is the relevance of the fact that "the individual selects his own effective environment"?

7. Discuss the relative influence of heredity and environment in producing differences in IQ between unrelated individuals, siblings, fraternal and identical twins. What light do studies of separated identical twins throw on the problem of differences in intelligence?

8. Discuss the evidence for improving personality and intelligence by improving the environment, with specific reference to foster-home studies. Does this demonstrate that heredity is unimportant in producing individual differences? Explain.

9. Explain the fact that the average IQ's of adopted children vary less than the average IQ's of own children when the children are grouped on the basis of their fathers' occupations.

10. Give two reasons why we might expect city children, on the average, to score higher than country children on intelligence tests. Do such scores mean that city children are more intelligent? Explain.

11. Why is it difficult to get a good estimate of the relative intelligence of different races? Mention one region in which this difficulty is minimized. What two important facts concerning race differences have been clearly established?

12. Mention some differences between the sexes which are largely or wholly determined by heredity. Mention some differences between the sexes in which the environmental influence is prominent. What is the most important fact which stands out when the male and female distributions are compared for almost any trait?

B. General Questions

1. Consider two pets, a cat and a dog, brought up from birth with equal solicitude in the same household. Each in his own way is a skillful hunter. The dog learns to do certain tricks and tasks, such as "fetching" sticks and stones, bringing home the paper in his mouth, and guarding the baby. But the cat loses interest whenever his stomach is not concerned and never learns anything very complicated. What is the most probable explanation of this difference in behavior? Are we simply comparing an inferior specimen of the cat tribe with a superior dog? Is the difference due to faulty parental training in the case of the cat, or to unequal educational opportunity? Or are there hereditary factors involved? Discuss. In general, are structural differences between species largely innate, or largely acquired, or what? What about differences in intelligence?

2. Refer to Figure 16, which shows impressively the influence of selective breeding on one kind of learning ability. Suggest two reasons why this is not adequate to settle the question of the origin of intelligence differences for all time. Cite several examples of selective breeding.

3. Several theories were suggested in the text to account for the preponderance of male geniuses and scoundrels. Can you suggest other explanations? Has man wholly outgrown the medieval notion that woman's essential function is interior decoration? Does society's attitude concerning what men and women "ought" to do (their roles) have an important bearing on the problem of sex differences in achievement? Do the traditional

methods of child-bearing and child-rearing give women an equal opportunity with men for fame or notoriety?

4. If women on the average show a greater linguistic facility than do men, why are there not more women in Congress?

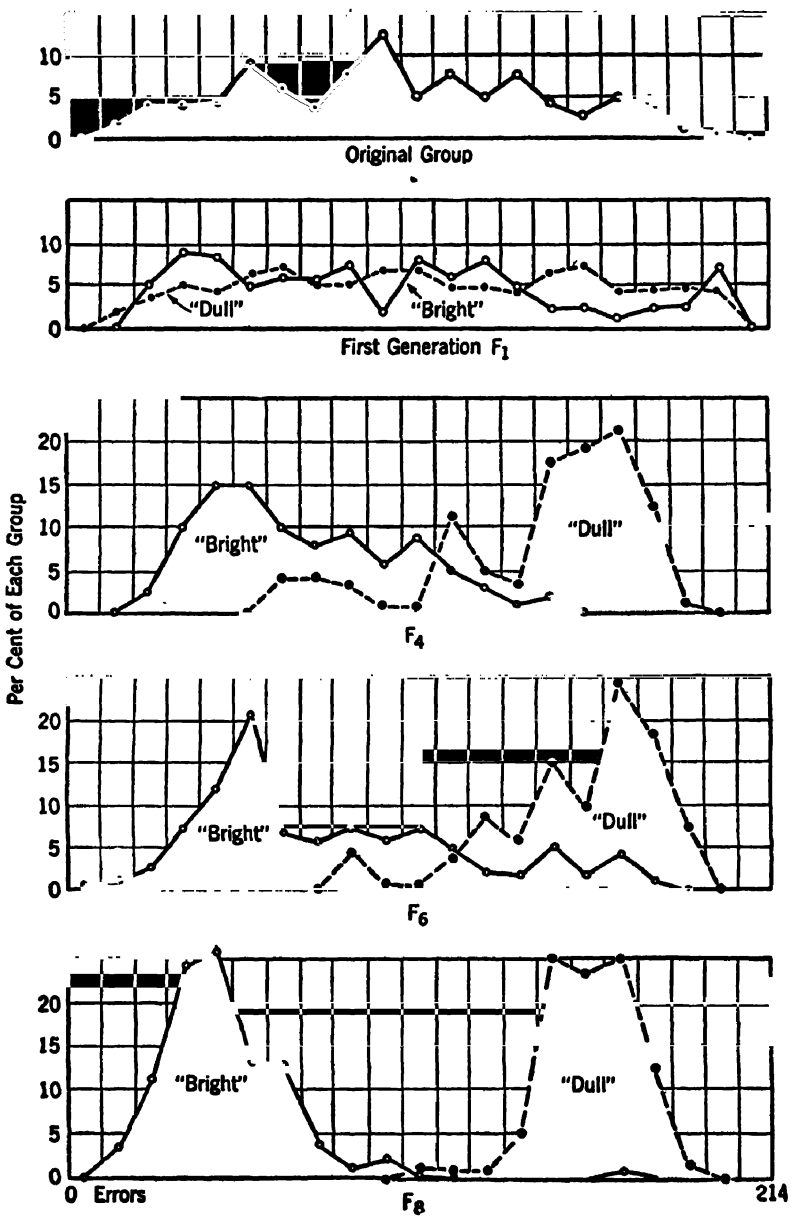


FIG. 16. The effect of selective breeding on the maze performance of white rats. The "brightest" and the "dullest" rats in each generation were inbred in this experiment by R. C. Tryon. The graphs show the errors made on a standard maze through eight generations. (*Reproduced from Valentine, W. L.*, Experimental Foundations of General Psychology, *by permission of Farrar & Rinehart, Inc.*)

5. Refer to the Thurber sketch of the inquisitive husband, Figure 39. There is no doubt that the implied sex differences in attitudes, interests, and consequent behavior are sometimes very real, though the male and female distributions overlap (see also Figure 14). Are such differences the inevitable result of hereditary sex differences? Discuss.

6. *Men at some times are masters of their fates:*
The fault, dear Brutus, is not in our stars,
But in ourselves, that we are underlings.
—*Julius Caesar*

Interpret this taunt of Cassius to Brutus in terms of the influence of heredity, environment, and the individual (the unique product of the two). Do its implications in general conflict with the implications of the quotation from Carlyle at the beginning of this chapter? Explain.

C. Special Questions

1. Johann Sebastian Bach's father, four generations of grandfathers, and four of his sons were all musicians, most of them distinguished. How do you explain this?

2. Figure 17 should speak for itself. Discuss the implications of this figure with respect to both sex and race differences.

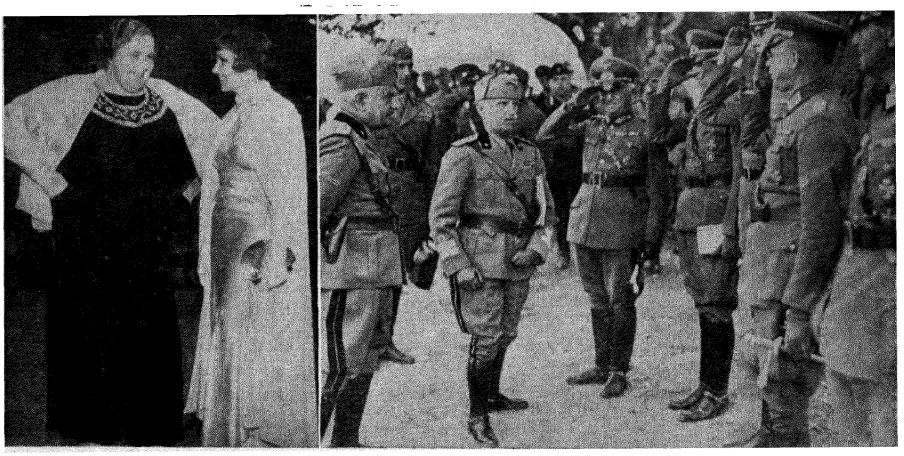
3. There is one word that typifies the Finnish character, that helps explain the well-nigh incredible resistance put up by the Finns against overwhelming odds when their territory was invaded before World War II. This word, a favorite among the Finns, is *sisu* (pronounced seé-su). It has no exact English equivalent, but it implies an almost superhuman bravery and endurance. Paavo Nurmi, who had enough of it to capture an impressive number of world track records, speaks of it as "patience and strong will without passion, that comes to men miraculously in times of stress."

The Finns have demonstrated beyond all question that they have, as a people, an abundance of *sisu*. Do you think this trait is the product of the rugged Finnish climate, physical inheritance, "social inheritance," or some combination of these factors? Discuss.

4. Darwin's theory dealt with a natural process which was supposed to bring about "survival of the fittest." Can you think of any practices or tendencies in "civilized society" which make for "survival of the unfittest" Discuss.

5. Did Lamarck's hypothesis regarding change in species stress heredity, environment, or both? Explain.

6. Can the all-time record for feeblemindedness, intemperance, and criminality established by the notorious Jukes family be satisfactorily explained in terms of heredity? Discuss.



Pictures, Inc. *Pictures, Inc.*

On the average, men are taller, stronger, and heavier than women.

Pictures, Inc. *Pictures, Inc.*

"Nordic men are blond . . . and inclined to be taciturn . . . ; they feel instantly that too loud talking is undignified." — *The Official Handbook for the Schooling of Hitler Youth.*

FIG. 17

MODIFIABILITY OF RESPONSES

Purpose. To demonstrate variations in the modifiability of responses with learning. In the first demonstration (I) we deal with a reflex response which is unlearned and which is relatively unmodifiable. In the second (II) we deal with a short series of connected responses which are in part unlearned and which can be modified with some effort by practice or learning. In the third demonstration (III) we deal with a set of responses which are random and meaningless without learning.

Materials. I. Flashlight or desk lamp. II. Watch with second hand, stop-watch, or metronome, preferably the last. III. Materials printed herewith.

Procedure. I. *The Pupillary Reflex.* 1. A pair of *O*'s is sufficient for this demonstration but, if the class is large, more pairs may be used so that all may see. In a somewhat darkened room the *O*'s are seated side by side a few feet apart, and the light is placed near enough to get results but not near enough to cause discomfort. The light is flashed into the eyes of each of the two *O*'s in turn and the change in the size of the pupils is noted. This is repeated 4 times with rest intervals between flashes of at least 10 seconds.

2. One of the *O*'s (or one member of each pair) is taken aside and instructed to try to inhibit the contraction of the pupils, without, of course, closing his eyes. Each of the *O*'s is given 20 or 30 trials more with rest intervals as before. Is there any evidence of success in inhibiting the reflex?

II. *Finger Drumming.* 1. The metronome is set to beat once every second. (If a metronome is not available, the instructor, with the aid of a stop-watch or a watch with a second hand, may count out the seconds.) At a given signal each member of the class is to drum softly on his desk 5 times with his right hand, in time to the beat of the metronome. *All five fingers* are to strike the desk during each drum beat, but *only one* is to strike the desk at the same instant. What percent of the *O*'s did this without error? For what percent of the *O*'s was the order of striking from little finger to thumb? For what percent was the order reversed? Enter the results in the table.

2. The foregoing procedure is repeated with the beat speeded up to 10 times in 5 seconds and with all *O*'s using the order *little finger to thumb.* What percent of the *O*'s could drum 10 times in 5 seconds in this order without error? Enter the result in the table.

3. The procedure in the previous section is repeated using the order *thumb to little finger.* Enter the result in the table. *Be sure not to practice this unless instructed to do so.*

4. The class is divided into two groups equated with respect to the number of *O*'s who made errors, and the number of errors made, in the previous step. Now, while one group is occupied reading, the other group is to practice drumming 20 or 30 times in the order thumb to finger, *slowly at first* and gradually faster as the skill is mastered.

5. After a 2-minute rest, step 3 in the procedure is repeated: the percent of *O*'s in each group who could drum 10 times in 5 seconds from thumb to little finger without error is calculated and entered in the table.

Conditions		Percent of *O*'s		
Order	No. beats in 5 secs.	Without error	Using order: Finger-thumb	Using order: Thumb-finger
1. Own choice	5	. ....	. .	. . . .
2. Finger-thumb	10	...		
3. Thumb-finger before practice	10	... .		
		Percent of *O*'s without error:		
		With practice	Without practice	
5. Thumb-finger	10	. ....	... . .	

III. *Learned Responses.* 1. The class is divided into two groups. One group is given the key to the conglomeration of letters below by the instructor; the other is "left in the dark." The members of both groups are given 6 minutes in which to examine the lines and to see what they can make of them.

B tusbjhiu-mbdfe uxjo, npopazhpujd,

Podf gfmm gps b cmpoe zpvoh ofvspujd.

Xifo tif hpu ijn dpogvtfe

Xjui ijt cspuifs, xip cppafe,

Ifs dibsnt dfbtfe up cf rvjuf tp izqopujd.

2. When the time is up, the responses of the two groups are compared by getting two or three samples from each.

Conclusions. 1. Could the *O*'s have carried out any response without both a heredity and an environment? Explain.

2. In which of the three demonstrations can we logically infer that the environmental influence was greater than the hereditary influence in bringing about a *difference* between the groups? Explain.

3. Which of the three sets of responses was least modifiable? Which was most subject to training, or learning?

4. In which of the demonstrations was there the strongest *suggestion* of a dominating hereditary influence? Explain. What further checks would you like to make before accepting such a conclusion?

5. In general, would you expect unlearned responses to be more subject to modification than learned responses or less so? Explain.

FILMS

Behavior of Human and Chimpanzee Infants After Six Months in the Same Environment

Some years ago Professor and Mrs. W. N. Kellogg made a very unusual and somewhat heroic study of the influence of heredity and environment

on the behavior of a young chimpanzee. This involved adopting the chimp and bringing him up as the boon companion of their own infant son (see Figure 23). For about a year he was treated, in every way humanly possible, as if he were their own child. This involved daily baths, the use of shoes, diapers, and similar tortures. Two films from this study are highly recommended. As soon as you have seen them fill in the parentheses below with a + for true and a − for false.

Experiments [1]

( ) 1. In several of the tests the initial and final trials were shown.

( ) 2. In the hand-in-loop test the chimp used the same method as the child in removing the loop.

( ) 3. Both subjects were successful in removing the loop from the ankle.

( ) 4. The chimp appeared to be more accurate in locating the source of sounds.

( ) 5. In the suspended-cookie test, the child pushed the chair closer to the goal before attempting to reach for it.

( ) 6. In the hoe, or rake, experiment both subjects were successful only when the cookie was directly in front of the hoe.

( ) 7. In the hoe experiment the chimp tried to reach under the fence with his arm.

( ) 8. If you take into account the number of trials necessary for solution, the chimp did better on the whole than the child.

(A scoring key is provided in *Notes for Instructors.*)

General Reactions [2]

( ) 1. Upright walking was well developed in the chimp.

( ) 2. When walking hand in hand with the child, the chimp usually took the lead.

( ) 3. When looking at colored pictures the chimp could not point as directed.

( ) 4. Both child and chimp habitually climbed into the chair from the side.

[1] *Experiments on a Human and a Chimpanzee Infant after Six Months in the Same Environment* (Kellogg). Silent. Psychological Cinema Register, Audio-Visual Aids Library, Pennsylvania State College, State College, Pa. Length, 435 ft. Price, $27.00. Rental, $1.25.

[2] *Some General Reactions of a Human and a Chimpanzee Infant after Six Months in the Same Environment* (Kellogg). Silent. Psychological Cinema Register, Audio-Visual Aids Library, Pennsylvania State College, State College, Pa. Length, 395 ft. Price, $25.00. Rental, $1.25.

( ) 5. The chimp was much more skillful than the child in drinking from a goblet and in managing a spoon.

( ) 6. The chimp was much more agile in climbing both the steps and the ladder.

( ) 7. In the "organized play" the chimp apparently did not get the idea very well.

( ) 8. The chimp was rougher on both the cat and the dog than the child was.

( ) 9. On the whole the chimp seemed less well developed physically than the child.

( ) 10. On the whole the chimp seemed much less well developed mentally than the child.

(A scoring key is provided in *Notes for Instructors.*)

A Film on Heredity

If a sound projector is available, there is an excellent film produced by Encyclopaedia Britannica Films, Inc., which effectively illustrates such mechanisms of heredity as mitosis and meiosis by means of animation and composite photography. It deals with the Mendelian ratio and shows how hereditary traits are transmitted. Unit characters and dominance are illustrated with cattle and guinea pigs.[3] As soon as the film is over take up the following discussion questions.

1. What is meant by mitosis? How does this result in all body cells having the same heredity?
2. Why don't all reproductive cells have the same heredity?
3. What is meant by dominance? Illustrate.
4. What is meant by the Mendelian ratio?
5. What is the most probable result of the mating of two hybrid black guinea pigs? Explain.
6. What is the most probable result of the mating of two animals who are hybrids with respect to two traits? Explain.

[3] *Heredity.* Sound. Encylopaedia Brittanica Films, Inc., 20 North Wacker Drive, Chicago 6, Ill. Length, 11 minutes. Price, with educational discount, $45.00. This film may be rented for $2.00 per day from the Division of General Extension, University System of Georgia, 20 Ivy St., S.E., Atlanta, Ga., and other similar libraries.

Name_____ Section_____ Date_____

CHAPTER SIX

OBJECTIVE EXERCISES

A. True-false and Multiple-choice Questions

( ) 1. The physiological causes of personality differences may be the result of both heredity and environment.

( ) 2. Heredity covers all the factors present in the individual at birth.

( ) 3. Heredity is more important than environment in the production of hybrids.

( ) 4. The individual is the product of his heredity and environment rather than the sum or common denominator.

( ) 5. Both heredity and previous experience determine what shall be the "effective environment" of the individual.

( ) 6. Individuals with differing heredities can be more easily made alike by similar environments than by different environments.

( ) 7. Which of the following are the most elementary carriers of heredity: (1) nuclei (2) chromosomes (3) genes (4) cytoplasms (5) sex endocrines?

( ) 8. The child usually gets a little more of its heredity from its mother than from its father because of the prenatal influence of the mother.

( ) 9. The chromosomes come from both parents; the genes come mostly from the father.

( ) 10. The fertilized ovum contains only 24 chromosomes from the mother.

( ) 11. Since brown-eye genes are dominant, a child cannot inherit blue eyes from two brown-eyed parents.

( ) 12. Differences in stature are determined by such environmental factors as nutrition and disease and by several pairs of genes in each individual.

( ) 13. Certain kinds of acquired characteristics may be transmitted by heredity.

( ) 14. The large differences in the IQ's of children brought up in the same orphanage must logically be attributed to differences in heredity.

( ) 15. Siblings differ in intelligence because of their differing genes and because they tend to select their own effective environments.

( ) 16. Fraternal twins have no greater hereditary similarity than other siblings.

( ) 17. The average difference in IQ points is the same for fraternal twins as for other siblings.

( ) 18. On the average identical twins differ no more from each other in IQ than does the same individual on repeated tests.

( ) 19. Studies of separated identical twins suggest that environment has a greater effect on social attitudes than upon temperament.

( ) 20. It has been demonstrated that a superior foster-home environment can produce average increases in IQ of from 5 to 10 points.

( ) 21. If the statement above were true, it would prove that heredity is unimportant in making individuals differ in intelligence.

( ) 22. Adult size and sex maturity are reached about two years earlier in girls than in boys.

B. Matching Exercises

Answers: (1) mechanical ability (2) average (3) environment (4) heredity (5) high quality (6) superiority (7) verbal matters (8) overlap (9) cultural (10) heredity and environment (11) red blood corpuscles.

( ) 23. Average differences in the IQ's of children whose fathers are engaged in different occupations can best be explained in terms of

( ) 24. The slight superiority in the tested intelligence of city children disappears when the country schools are of

( ) 25. The sex of the individual is determined by . .

( ) 26. Men have about 10 percent more than women.

( ) 27. We should distinguish between race superiority, which should be based on better genes, and " . . superiority."

( ) 28. Races not only differ in native intelligence much less than was formerly supposed but the distributions . greatly.

( ) 29. Girls tend to be better than boys in

( ) 30. Sex differences in behavior and achievement are merely . . . . . differences; the male and female distributions overlap.

CHAPTER SEVEN

Interaction with the Environment

I see you stand like greyhounds in the slips,
straining upon the start. — Henry V

QUESTIONS FOR DISCUSSION

A. Text Questions

1. How are the questions *Why?*, *How?*, and *What?* related to the words *goal*, *motive*, and *route?* How are both sets of words related to the field of general psychology?

2. Summarize the relationship between the individual and his environment, making use of the concepts of resisting, using, participating, and adjusting.

3. Explain and compare the *W—O—W* and the *S—O—R* formulas, mentioning the receptors and the effectors. How can these formulas be combined?

4. A bathing beauty posing for a picture is bowled over by a wave from behind. Why is it correct to say that no stimulus-response relationship is involved in this reaction?

5. Name and illustrate the three principal factors in the individual which influence his response to a stimulus.

6. Show what is meant by selectivity and combination, with respect to both reception and response. Illustrate shifting of response.

7. Tell briefly what is meant by the term *set*. Give an illustration of both preparatory and continuing set. Would you say that there is a sharp distinction between them? Illustrate situation set and goal set.

8. Use a common type of word association test to illustrate mental set. Illustrate both intentional set and unintentional set.

9. How does the *W—S—Ow—R—W* formula symbolize the relation of the individual to the environment? Use the process of reading to illustrate this.

10. How does the process of reading illustrate combination and shifting? What are the principal factors that may account for slowness in silent reading?

11. How may "doing two things at once" involve either combination or the principle of shifting? Does this involve a violation of the principle of selectivity? Explain.

12. Can we say that when supposed distractors fail to distract there is no loss of efficiency? Explain. Which are usually more important, internal or external distractors?

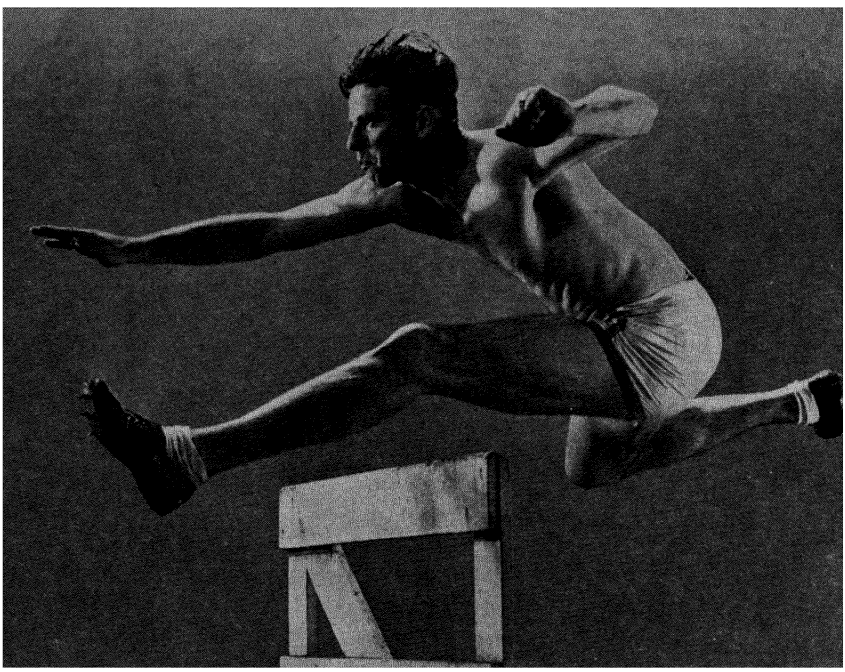


FIG. 18. High-hurdler Jim Humphrey of The University of Southern California. Humphrey's best time up to the spring of 1939 was 14.2 seconds, as compared with the world's record of 14.1. "In action he never breaks his rhythm: three quick forward strides, then a short graceful soar, followed by three more strides." (Life Magazine.)

B. General Questions

1. From your own experience show how the same individual can at times resist and avoid the environment and at other times use and participate in it.

2. In batting a ball into the right-field bleachers (or in any similar feat) which, if any, are more important, receptors, effectors, or nerves? Explain. What part is played by stimuli, by responses, and by inhibition?

3. Admiral Byrd, in his book *Discovery*, tells of an amusing little incident that occurred a few hours after his second expedition had landed at Little America. After some hours of hard labor with pick and shovel, the party had dug its way into one of the buildings abandoned four years be-

fore. Suddenly, as the men were examining the frozen contents of the mess hall, *the telephone rang!* Byrd comments on this: "If Haile Selassie had crawled out from under one of the bunks, we couldn't have been more taken aback. . . . Peterson had found the telephone and pressed the buzzer. We heard him laugh, . . . 'By yimminy, she works!' "

What has this incident to do with set? Can set sometimes be misleading as well as helpful? Can you recall any incident of a similar nature from your own experience?

4. Examine Figure 18. This picture of Jim Humphrey taking the hurdle is a beautiful illustration of set. In addition to the set of the moment, does the hurdling rhythm involve any continuing or preparatory sets? Does a shift in set involve a shift in attention? In a race what other stimuli compete for the hurdler's attention? Does this result in divided attention? Or can the well-trained nerves and muscles execute their tasks automatically while the attention is directed elsewhere? Can you illustrate this last phenomenon from your own experience in athletics or in other fields (say, in typewriting or in playing some musical instrument)?

5. Each of four travelers in the Sahara is presented by his Bedouin host with a bowl of water. One quaffs the water in a single draft. The next, more hot and sticky than thirsty, laves his hands and face in it. Another, anxiously wondering whether he paid his fire insurance premium before leaving home, ignores it. And the last, thirsty but a slave of the bottle, throws the water back in his host's face. How do these varied reactions to the same external situation illustrate the importance of structure, temporary state, and activity in progress?

6. Can you recall any personal experience in which a distraction, a petty annoyance, or a supposed handicap acted as a spur or a challenge to greater effort so that you actually did better work? How do you explain this in terms of your introspections, or your state of mind, as nearly as you can recall them?

7. Consider the Bill Mauldin cartoon in Figure 19. What specific set is responsible for this assinine remark of the officer? From your own observation what do you think of this tradition? (Confine your remarks to the English language.)

C. Special Questions

1. Apply the *W—S—Ow—R—W* formula to any two of the following activities: (a) taking a turn at bat and achieving something more than a strike-out; (b) playing several measures of music on a piano or some orchestral instrument; (c) copying a sentence on the typewriter; (d) an exchange of blows in the prize ring; (e) memorizing a couplet of verse, the principal parts of some cussed foreign verb, or a complicated formula in physics or chemistry; (f) dodging taxis in a crowded thoroughfare; (g) executing a "tack" in a small catboat, sloop, or yawl; (h) writing a sonnet, a short essay, or a letter requiring some thought; (i) a hungry man's con-

quest of a chicken dinner; (j) discovering an enraged bull in a lonely pasture and beating him to the nearest fence.

2. Sir Malcolm Campbell has on several occasions broken the world's speed record on the shores of the Great Salt Lake in Utah. On one of his trial runs, when his car was hurtling along at over 300 miles an hour, he had a blowout. Why was he not knocked into the middle of next week? Do the

FIG. 19. "Beautiful view. Is there one for the enlisted men?" (*Copyright 1944, United Features Syndicate, Inc.*)

facts of attention and set throw any light on this question? Explain. Why doesn't a football back when literally lifted off the ground by the tackler before being thrown get hurt more often? On the same basis explain why it is illegal to tackle a man who is in the act of receiving a pass or a punt?

3. If the Hollywood portrayal of life in the modern business office is correct, would you say that the modern business man, when dictating, is in some degree duplicating Julius Caesar's feat of dictating several letters at once? How could this task be simplified? Would a dictophone help? Explain.

4. Creative geniuses often do their best work in a white heat of concentrated attention lasting hours on end. Can you recall any specific example of this in any field? What enables such persons to ignore the internal distractions of hunger and fatigue in addition to common external distractions?

5. What is the meaning of the quotation from Shakespeare's *Henry V* at the beginning of the chapter? What is its setting in the play? What kinds of set are involved?

THE EFFECT OF SET

Purpose. To demonstrate the effect of set in mental work.

Materials. Lists of stimulus words, given below. A stop watch or watch with second hand.

Procedure. With the aid of the samples below, *O* familiarizes himself with the types of response called for by the task of "Opposites," by the task of "Coordinates," etc. *E* then announces the first task to be done, and *O* reviews the proper sample and gets well set for this particular task. *E* then assigns the list * to be used with this task and allows 45 seconds in which *O* writes as many response words as he can. *E* then announces another task, assigns the list * to be used, and allows 45 seconds for the responses. And so on.

Opposites		Adjective-noun		Agent-action	
Stimulus	Response	Stimulus	Response	Stimulus	Response
sick	well	wrong	road, etc.	tree	grow, etc.
large	small	upper	floor, etc.	bird	sing, etc.
rich		strong		merchant	. .
useful		blond		wheel	. .

Coordinates		Verb-subject		Verb-object	
Stimulus	Response	Stimulus	Response	Stimulus	Response
door	window, etc.	blow	wind, etc.	read	book, etc.
pin	needle, etc.	gallop	horse	applaud	speaker, etc.
grocer		pay	.	puncture	.
apple		stop	.	learn	.

If *O* finds himself "stuck" on any word, let him skip it and pass on to the next.

At the end of the experiment *O* "retrospects" and answers the following questions:

1. Were you conscious of any confusion, any difficulty in keeping the tasks separate?

2. Did you observe any other sources of difficulty?

Results. Each *O* examines his responses critically for mistakes and counts the number of correct responses to each list.

*From pages 78 and 79.

Lists 1 and 4, 2 and 5, 3 and 6, respectively, contain ten words in common. Find out whether the responses to the same word in different lists are different and conform to the different tasks assigned. In other words, did the "sets" operate efficiently? In how many cases did the same stimulus word get the same response, erroneously, in spite of the difference in assigned task?

Discussion. If time permits these questions may be discussed in class.

1. How can you account for the fact that the same stimulus may arouse different responses at different times, even in the same individual?

2. What is meant by "set" in this kind of work?

3. Did the experiment show that set was efficacious? How?

4. Dividing the time allowance of 45 seconds per list by the number of responses (correct and incorrect) written for any list gives a sort of reaction time.

(a) Is this an "associative" reaction time?

(b) Why is it so much longer than the "simple" reaction time?

(c) Is it probably longer or shorter than it would be with oral instead of written responses?

(d) Did any one task give distinctly longer reaction times than the other tasks? Explain.

1.	2.	3.
bite	soft	eye
command	cloudy	fish
hear	easy	soldier
start	ripe	ice
cut	new	clock
knit	high	frog
overflow	expensive	dog
win	dark	baby
recite	smooth	knife
see	raw	fire
cure	tall	sun
burn	hot	heart
entertain	hilly	broom
pull	sour	horse
sting	round	rain
sweep	heavy	king
steal	curly	ship
rule	empty	lion
climb	front	flower
continue	sharp	bell

Lists of Stimulus Words

(Continued)

4.	5.	6.
steer	white	gun
sweeten	stale	thunder
hear	easy	soldier
obey	north	milk
cut	new	clock
scold	shallow	head
overflow	expensive	dog
confess	wet	doctor
recite	smooth	knife
elect	slow	nose
cure	tall	sun
burn	hot	heart
convict	loud	hammer
pull	sour	horse
invade	noisy	carpenter
sweep	heavy	king
advertise	first	pen
rule	empty	lion
climb	front	flower
rehearse	narrow	wind

Name_____ Section_____ Date_____

CHAPTER SEVEN

OBJECTIVE EXERCISES

A. True-false and Multiple-choice Questions

( ) 1. Psychology is primarily concerned with the *What*, the *Why*, and the *How* of the individual's activities in relation to the environment.

( ) 2. The normal organism uses and participates in the environment rather than resists it.

( ) 3. The individual adjusts his relations with the environment, or changes them for the better (as far as possible).

( ) 4. *W—O—W* stands for "Wanted One World."

( ) 5. Which one of the following is *not* an effector: (1) an eye (2) a muscle (3) a gland?

( ) 6. A psychological stimulus cannot be adequately defined without implying a response.

( ) 7. The best available stimulus-response formulas enable us to predict the response if we know the stimulus.

( ) 8. Which item is *least* like the others: (1) stimulus (2) response (3) structure (4) temporary state (5) activity in progress?

( ) 9. Set, which may be for either stimulus or response, is selective.

( ) 10. Simple reaction time is quicker than associative reaction time, and associative time is quicker than choice.

( ) 11. The either-or type of response is more characteristic of the organism than are shifting responses.

( ) 12. "Combination" is a term for compromise responses.

( ) 13. Selectivity and combination are present in every normal activity, both sensory and motor.

( ) 14. Set is almost always preparation for a single act.

( ) 15. A situation set is a continuing control which helps to prepare the individual for the present environment.

( ) 16. There is a clear-cut distinction between situation set and goal set.

( ) 17. The reaction-time method can be used to prove that one reads a short, familiar word as a whole, not letter by letter.

( ) 18. Which one of the following is *not* a factor contributing to slowness in silent reading: (1) moving the lips (2) minute examination of words (3) insufficient vocabulary (4) distaste for reading (5) moving the eyes in a series of little jumps rather than perfectly evenly over the line of print?

( ) 19. Context in reading exerts a selective influence.

( ) 20. Julius Caesar could dictate several letters at the same time because of his phenomenal ability to attend to two or three objects simultaneously.

( ) 21. In one "distraction" experiment reported, the effect of suggestion was greater than the effect of the distraction.

( ) 22. Common internal distractions are usually more influential than common external distractions.

B. Matching Exercises

Answers: (1) halation (2) selectivity (3) nihilism (4) receptors (5) inhibition (6) interaction (7) narcolepsy (8) effectors (9) set (10) comprehension (11) stimuli.

( ) 23. The *W—O—W* formula represents the continuous . . .. of the individual and the environment.

( ) 24. The individual picks up stimuli from the environment by means of his .

( ) 25. Preparatory .. . is one kind of activity in progress.

( ) 26. The radio and the living organism both exhibit . . in their reception.

( ) 27. Motor and glandular responses are carried out by means of the . . . .

( ) 28. Probably the most important factor affecting speed of silent reading is speed of . . . .

( ) 29. When the response is a stopping of activity it is called .....

( ) 30. When receptors are acted upon by ... .. the effectors are brought into play.

CHAPTER EIGHT

The Nervous System

Oh the nerves, the nerves; the mysteries of this machine called man! — Dickens

QUESTIONS FOR DISCUSSION

A. Text Questions

1. How does the general structure and organization of the brain help us to explain both the unity and variety of response of which the individual is capable?

2. Name three important parts of the neuron and tell what is the function of each. What is the nature and function of the synapse? In what way do these structures fit in with the principles of combination and selectivity?

3. If the "all or none law" holds for nerve activity, explain how a stronger stimulus can produce a stronger response. Upon what single variable does the strength of a response depend?

4. Describe the simplest possible reflex arc. What is a more common type of reflex arc? What are four important attributes of the nerve center which the simplified picture of the reflex arc does not adequately suggest?

5. Discuss briefly the main parts of the brain, bringing in wherever possible the general function of each and the relationship of the parts to each other.

6. Where are the gray matter and the white matter located, and what is the function of each?

7. Give some evidence to indicate the value of degeneration. What are three other methods for investigating the same field?

8. Where are the motor and premotor areas located? What is their general function and what is their relation to each other? Do any other parts of the brain have similar functions?

9. Describe the functions of the occipital lobe and tell something of the methods used to demonstrate these functions.

10. What light do the conditions of aphasia, apraxia, and agnosia throw upon the combining or organizing functions of the brain?

11. What is the function of the frontal lobes? Give some evidence from human pathology to support your statement.

12. What two important general functions has the cortex as a whole? Give evidence from experiments with monkeys and rats.

B. General Questions

1. Use some everyday behavior sequence involving a mental set to illustrate both unity and variety in the same general pattern of response.
2. Would a telephone operator need to increase her efficiency if stationed at the "switchboard of the nervous system"? Explain.
3. In what ways do you think your behavior would be different if you had no white matter in your nervous system, but only gray matter? Explain. Under what conditions do you sometimes act as if this were true?

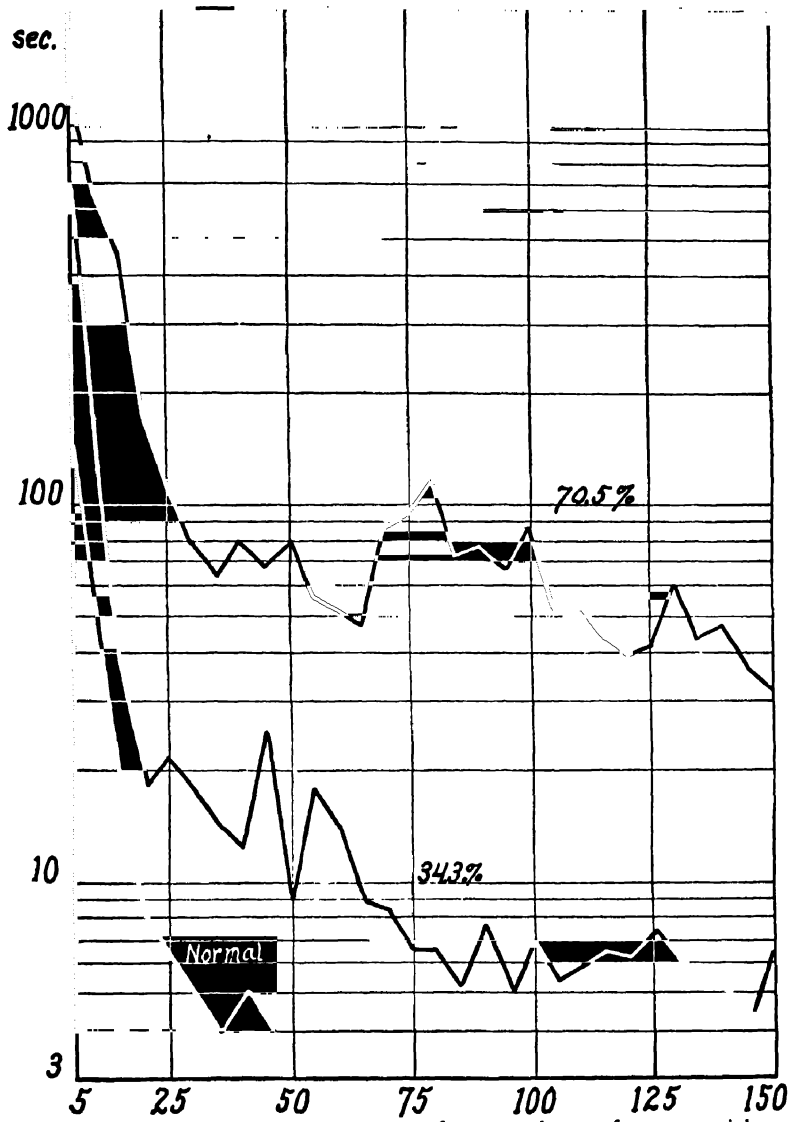


FIG. 20. Comparison of the learning curves for normal rats, four rats with maximal destruction of brain tissue (70.5%), and four rats with an intermediate extent of tissue destruction (34.3%). The X axis represents the trial number and the Y axis the time required for running through a simple maze. (*Reproduced from Lashley, K. S.*, Brain Mechanisms and Intelligence, *by permission of The University of Chicago Press.*)

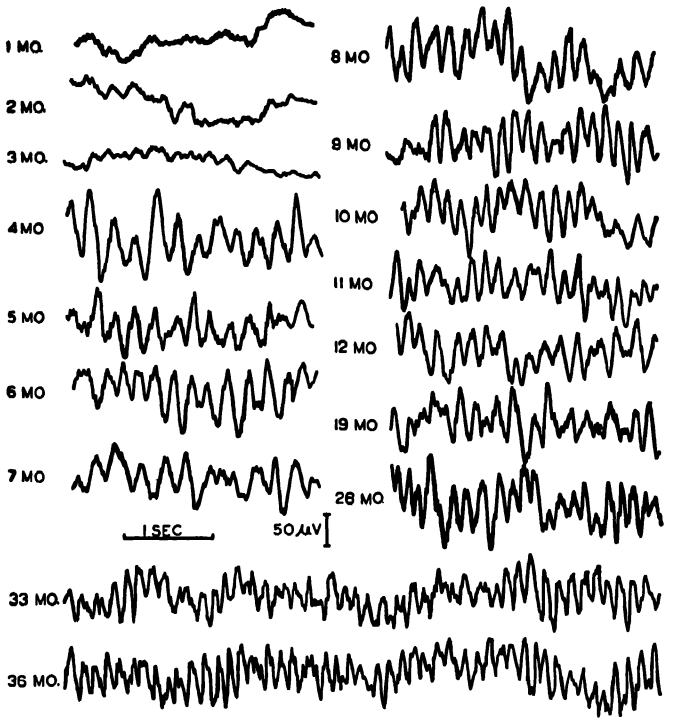


FIG. 21*a*. Tracings of the brain-potential records from the occipital region of a child during the first three years of life, showing the onset of the occipital alpha rhythm at four months (frequency 4.0 per second; amplitude 64 microvolts) and its subsequent development to three years of age (frequency 7.3 per second; amplitude 32 microvolts) (*From Lindsley*, J. Genetic Psychol., *1939, 55, 197–213, by permission of the editor.*)

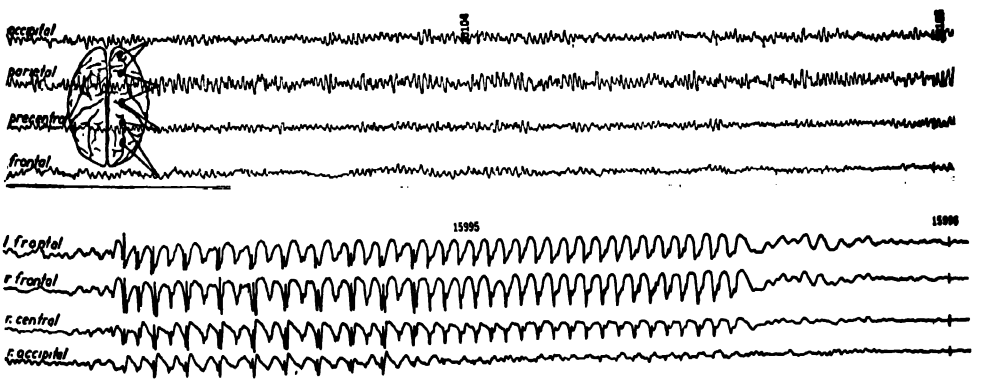


FIG. 21*b*. "Brain waves" of normal and epileptic subjects contrasted. The upper EEG record (electroencephalogram) is from a 32-year-old well-adjusted woman. The lower record is from a 7-year-old boy during a petit mal epileptic seizure. It shows a typical spike and slow wave pattern, in contrast to the relatively rapid alpha wave with low amplitude shown by the normal subject. (*From an article by Donald B. Lindsley in* Fields of Psychology *by Seashore and associates, New York, Henry Holt and Company, Inc., 1942. By permission of the author and the publisher.*)

A Film on the Nervous System [1]

This sound film is highly recommended. It describes and illustrates the nature and function of the nervous system, including the anatomy of the spinal cord, axones, dendrites, nerve bundles, receptor and effector organs, nerve impulses, and the reflex arc. Amplified sounds of nerve impulses are

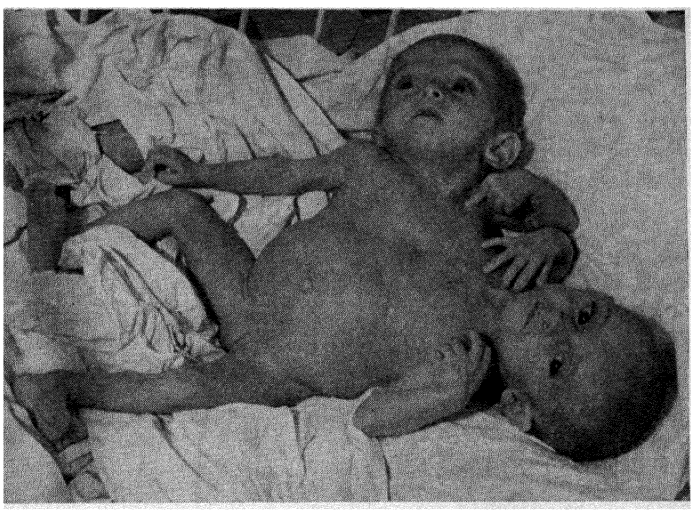


FIG. 22. Extremely rare coalescent twins, resulting from an incomplete separation of a single ovum. There are two heads, two sets of arms, two spines, two stomachs (internally), and one pair of legs. Though there are two hearts, the circulatory systems are merged so that they both use the same blood. Scientists observing these twins believe they demonstrate that sleep is initiated by the nervous system and not by poisons in the blood stream; for the twins have different nervous systems but the same blood, yet they may sleep at different times. (Though most twins of this type are born dead or die soon after birth, these twins lived about a year.) (*Preslit photo.*)

reproduced. As soon as the presentation is over, discuss the following questions:

1. What are the main divisions of the nervous system? What are their principal functions?
2. How are nerve cells connected?
3. What is the nature of the nerve impulse? About how fast does it travel?
4. Discuss the relative size of the spinal cord in men, cats, and frogs.
5. What has been an important trend in the evolution of the nervous system?

[1] *The Nervous System.* Sound. Encyclopaedia Britannica Films, Inc., 20 N. Wacker Drive, Chicago 6, Ill. Length, 10 min. Price, with educational discount, $45.00. Rental, $2.50 for the first day and $.50 per day thereafter.

6. What is the relation between chemical change, irritability, and life?

Films Showing the Effects of Injury to the Nervous System

There are a great many good films showing the effects on behavior of injury to the brain or the spinal cord. Two of these are reviewed in this manual:

Maternal Behavior in Decorticated Rats, produced by Dr. Frank A. Beach, is covered in Chapter 10, p. 110; and

Impairment of the Abstract Attitude (humans), produced by Drs. Kurt Goldstein and Martin L. Scheerer, is covered in Chapter 18, p. 208.

THE UNITY OF THE NERVOUS SYSTEM

Purpose. To illustrate the unity of the nervous system by showing the influence of activity in one part of the system upon responses in another. In the first demonstration (I) the *facilitation* of a spinal reflex by activity elsewhere is illustrated. In the second (II) the *inhibition* of response is brought about by the *interference* of two antagonistic sets of reactions.

Materials. I. A rubber hammer or a heavy ruler with a rounded back edge suitable for eliciting the knee jerk. A yardstick or meter stick. II. None.

Procedure. I. *Facilitation of the Knee Jerk.* 1. The instructor will select an *O* (or two, if time permits) whose knee jerk, or patellar reflex, is readily elicited by a gentle blow with the rubber hammer (or the back of a ruler) on the patellar tendon, just below the kneecap. The *O* is seated comfortably with legs crossed. The yardstick, or meter stick, is placed so as to form, approximately, the chord of the arc through which the toe moves during the reflex response. *E* then runs off 10 trials, keeping the strength of the stimulus as constant as possible. The approximate distance which the toe moves along the measuring stick is noted for each trial and recorded in the table below. This will give a rough measure of the strength of the response.

2. *O* is now instructed to clench both fists as hard as he can when *E* says "Now," just before giving the stimulus, and to maintain the tension until after the response. This procedure is repeated until 10 trials have taken place. The results are entered in the table.

3. Compute the two averages and compare them for evidence of facilitation.

Trial number	Amount of the Response (Approximate)			
	Normal conditions		With fists clenched	
	O_1	(O_2)	O_1	(O_2)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
Averages	( )		( )	

II. *Interference.* 1. The entire class will serve as *O*'s. Move the right hand and the right foot simultaneously in a clockwise direction for a few seconds. Note the degree of difficulty experienced in executing these maneuvers.

2. Next move the right hand in a clockwise direction and the left foot in a counterclockwise direction simultaneously and note the degree of difficulty experienced.

3. Now move simultaneously the right hand in a clockwise direction and the right foot in a counterclockwise direction (if you can) and note the degree of difficulty. Try again. Is there any improvement?

Discussion. 1. Was there any evidence of facilitation of the patellar reflex (for either *O*)? Suggest an explanation for this in terms of the connections in the nervous system and possible changes in general muscular tonus while fists were clenched.

2. Which of the three tasks was the most difficult, or even impossible? Did the difficulty lie exclusively in moving one member clockwise and the other counterclockwise? Justify your answer. What two factors together caused the difficulty? Can you suggest an explanation for the differences in degree of difficulty in terms of probable activity in the motor areas of the cerebral hemispheres?

3. Does the demonstration of inhibition through interference relate in any way to the variety of response of which the organism is capable? Could there be great variety of response in a unified organism without inhibition from time to time? Explain.

4. Are these two simple demonstrations in any way related to the general characteristics of behavior, selectivity and combination? Explain.

Name_____ Section_____ Date_____

CHAPTER EIGHT

OBJECTIVE TESTS

A. True-false and Multiple-choice Questions

( ) 1. Rapid communication from the effectors to the receptors is provided by the nerves.

( ) 2. The brain acts as a centralizing agency, thus enabling the organism to act as a unit.

( ) 3. The largest nerve in the body, the optic nerve, contains as many as 400,000 fibers.

( ) 4. The nerve center is essentially a big reservoir for receiving stimulation from the sensory nerves and pouring it out into the motor nerves.

( ) 5. The axon is a smooth slender branch of the nerve cell, sometimes several feet long.

( ) 6. Communication across a synapse is always from axon to dendrite.

( ) 7. Each dendrite terminates so as to establish synapses with several other neurons.

( ) 8. The "all or none law" holds good for single nerve fibers but not for muscle fibers.

( ) 9. The stronger the stimulus applied continuously to a nerve fiber the quicker the succession of response waves.

( ) 10. The stronger the stimulus the larger the number of nerve and muscle fibers stimulated.

( ) 11. A reflex action is always quicker than a prepared reaction for which the individual is set.

( ) 12. The path from a sense organ through the nerve center to a muscle is called a reflex arc. This involves a minimum of three neurons.

( ) 13. The concept of the simple reflex arc needs to be supplemented by the concepts of multiple nerve paths, converging axons, and branching axons.

( ) 14. The "lower centers" for the limbs and most of the nerves of the trunk are located in the: (1) cerebellum (2) cord (3) brain stem (4) thalamus (5) corpus callosum.

( ) 15. The "higher centers" in the cerebrum and cerebellum coordinate the "lower centers," which in turn coordinate the muscles.

( ) 16. The gray matter consists of fibers connecting all parts of the white matter.

( ) 17. The method of degeneration is used in studying brain localization.

( ) 18. Electrical stimulation of the precentral gyrus will produce muscle movements in various parts of the body.

( ) 19. The cerebrum and the cerebellum work as a team in coordinating motor behavior, the cerebellum taking the initiative.

( ) 20. An injury to the right visual area of the cortex would produce some degree of blindness in one eye only.

( ) 21. The regions bordering on the primary visual area in the occipital lobe contribute to an understanding of what is seen.

( ) 22. Most of the cortex not in the sensory or motor areas is partially devoted to the principal job of the cortex — organizing.

B. Matching Exercises

Answers: (1) motor area (2) visual area (3) lower centers (4) cortex (5) auditory area (6) synthesis (7) agnosia (8) patterns (9) cerebellum (10) frontal lobes (11) apraxia.

( ) 23. The speech center lies in the temporal and parietal lobes not far from the .

( ) 24. The loss of the ability to "do" resulting from brain injury is called

( ) 25. Brain injury resulting in inability to get the meaning of signs and symbols is called .....

( ) 26. Injuries to the . . . . cause changes in the realm of management and character rather than in the realm of intellect and knowledge.

( ) 27. The brain must perform two kinds of . , incoming and outgoing.

( ) 28. One general function of the . is probably learning and remembering.

( ) 29. The brain acts in wide-spreading . . , which shift from moment to moment.

( ) 30. The .... begins to function before birth, but the cortex is apparently not in functional condition until some weeks after birth.

CHAPTER NINE

How the Individual Develops

Sumer is icumen in,
Lhude sing cuccu!
Groweth sed, and bloweth med,
And springth the wude nu – .
— Anon., circa 1250.

Learn young, learn fair; learn auld, learn mair. — John Ray

Ancora imparo (Still I am learning).
— The favorite maxim of Michelangelo.

QUESTIONS FOR DISCUSSION

A. Text Questions

1. What are the two principal components of development? Which of these is relatively more important in human beings than in the lower animals?
2. What is meant by the term *instinct?* Give several examples. With what type of activity is instinctive activity usually contrasted? Give examples. Is there always a sharp contrast between the two? Explain.
3. How is maturation related to differentiation and to interaction? Give several illustrations to support the statement that some development must precede function.
4. Criticize the following statement, giving evidence to support your criticism: Activities which appear before birth are due to maturation; those which appear after birth are due to learning.
5. Describe an experiment which illustrates growth through use.
6. What anatomical evidence is there that the brain develops through use, as well as through maturation?
7. What relationships exist among exercise, learning, growth, and development? What is the relationship between reinforcement and learning? Illustrate.
8. Describe two important behavioral sequences which appear in the growing infant. Does maturation or learning appear to be the major factor involved?

people in their "teens"? In what respect is this true? In what respect not true?

8. Is the turning of the young man's fancy in spring a matter of learned or unlearned behavior? Or will he never learn? Explain.

9. Examine Figures 24 and 25, which indicate that maturation is more nearly complete in the guinea pig at birth than it is in the kitten. But the peak development comes earlier in the guinea pig. In general the longer the period of maturation, the higher the level of ultimate development. Cite

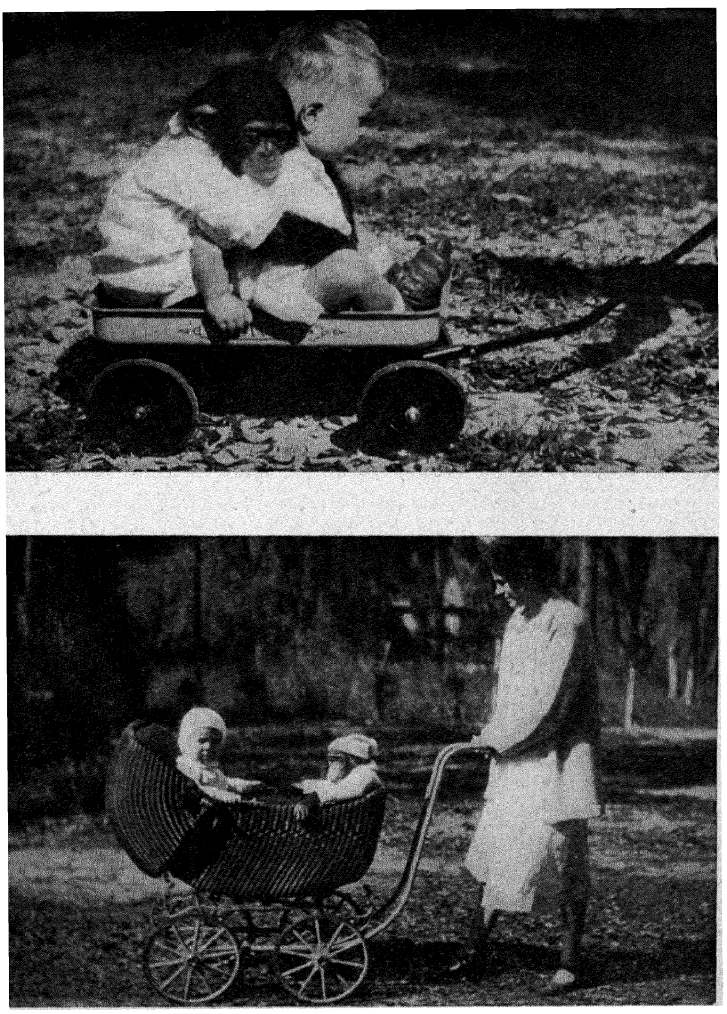


FIG. 23. Gua and Donald were brought up for months as boon companions. In every possible way their treatment was identical. (*Reproduced from Kellogg, W. N., Kellogg, L. A.*, The Ape and the Child, *by permission of McGraw-Hill Book Company, Inc. Photos courtesy W. N. Kellogg.*)

examples from several species to illustrate this. Do you think that the functions which appear gradually in these figures involve more learning than those which appear abruptly? Explain.

10. Look at the David Low cartoon entitled "Progress of Man" (p. 177). Now look at Figure 26 which might have been called "Progress of Boy." How is it that at some stage in "development" we get such a depressing transition from one state to the other? What can be done about it?

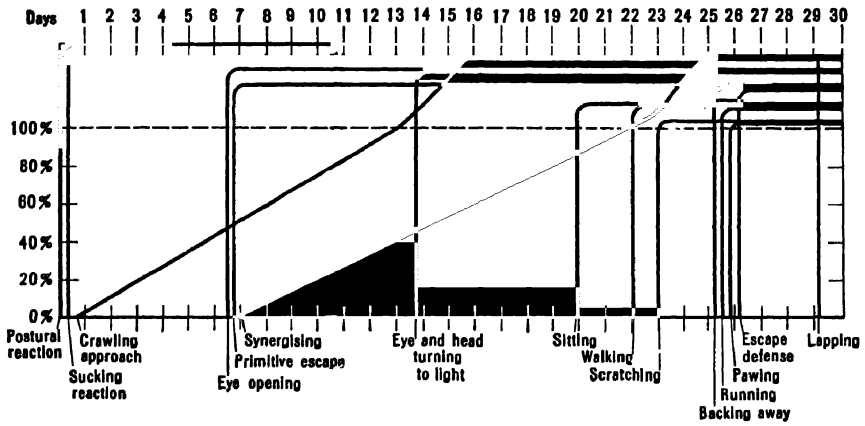


FIG. 24. The time after birth when different elements of a kitten's behavior make their appearance. An activity which comes in gradually is indicated by a sloping line. There are definite developments in the brain that account for the sudden emergence of some of these behavior patterns. (*From Tilney, F., and Kubie, L. S. "Behavior in its relation to the development of the brain."* N. Y. Neur. Inst. Bull., *1931, 1. By permission the editor.*)

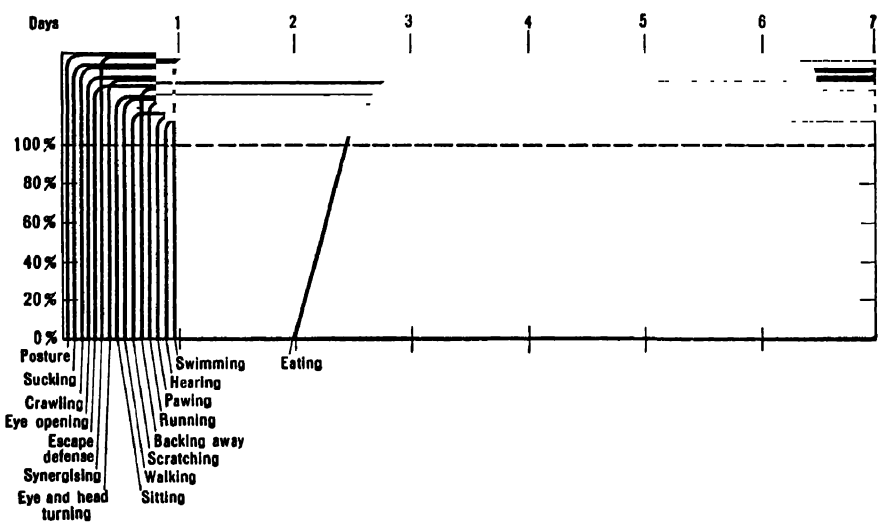


FIG. 25. The same for the guinea pig. Note that the guinea pig does many things immediately after birth which the kitten does not show for days or weeks. The guinea pig's brain is further along in its development at birth. Notice that the diagram starts at birth and credits to the first day all the acts which are ready at birth, some of which have been ready longer than others. (*Same source as Figure 24.*)

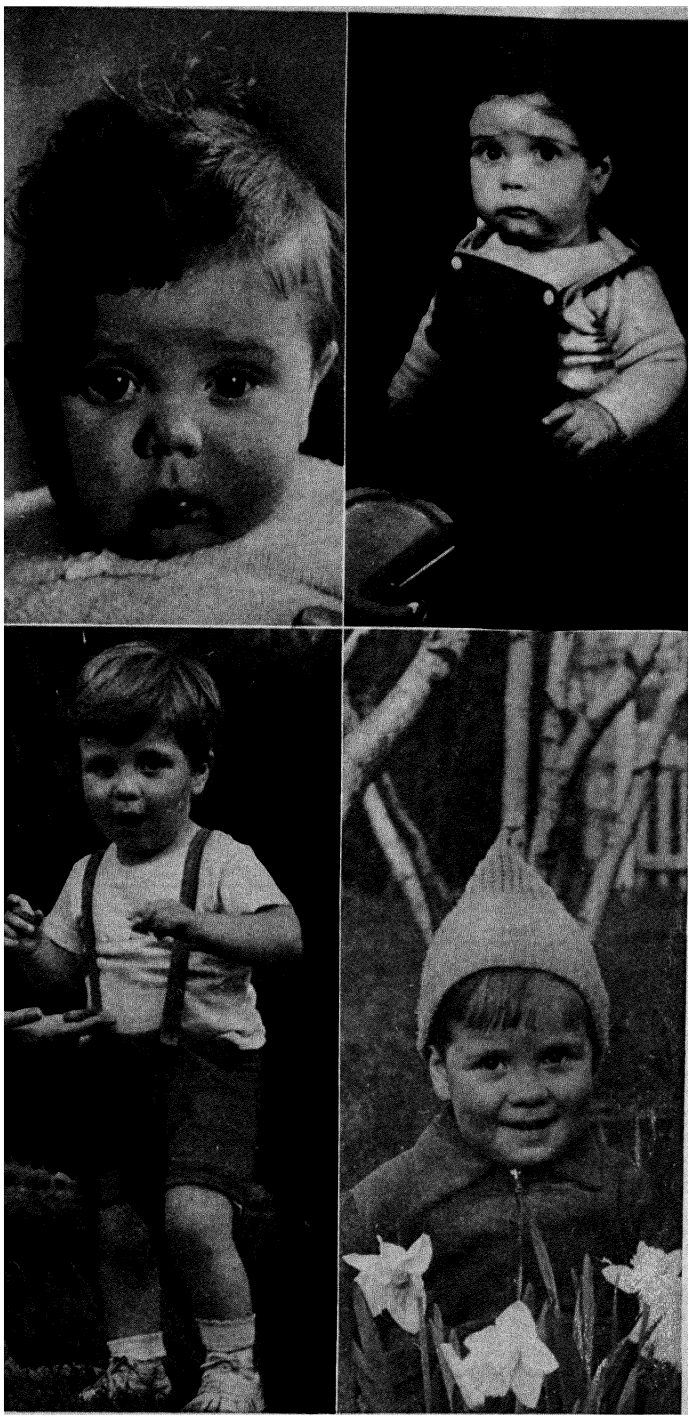


FIG. 26. Four stages of development. The same boy is shown at six months, twelve months, twenty-three months, and thirty months in relatively natural reactions.

C. Special Questions

1. It is said that at the age of three Macaulay was as fond of reading from volumes "as big as himself" as he was of eating. When he was seven he wrote a compendium of universal history which "really contrived to give a tolerably connected view of the leading events from the Creation to the present time." Would you explain this in terms of excessive exercise of the intellect, or in terms of precocious maturation, or what?

2. The text shows a curve which indicates that the peak achievement in baseball is between ages 25 and 30. Can you cite several cases which showed improvement beyond these peak years? Is there any evidence of exceptional track performance beyond this period? Would you expect the peak for football to be earlier? Why?

3. Cite several examples of precocious performance in the field of music. In general, do you attribute this more to precocious maturation of rare natural talents or to excessive practice due to pressure from elders?

4. What, approximately, were the most productive years of any three of the following: Palestrina, Bach, Handel, Gluck, Haydn, Mozart, Beethoven, Weber, Rossini, Schubert, Mendelssohn, Chopin, Schumann, Liszt, Wagner, Verdi, Gounod, Franck, Smetana, Brahms, Saint-Saëns, Bizet, Debussy, Moussorgsky, Tschaikovsky, Dvorak, Grieg, Rimsky-Korsakov, Widor, Sibelius? Would you think that the peak achievement in composing music would be earlier, later, or about the same age as for painting; i.e., near age 35? Explain. Would you think that the age of greatest distinction for orchestra leaders would be about the same as for composers, or later? Explain.

5. The text cites evidence that the most productive years for writers of modern times are between 30 and 45. Cite some notable exceptions from any period, such as Shaw. What about Shakespeare?

6. What has the medieval classic verse at the beginning of the chapter to do with development? Which of the two major components, maturation or learning, is most clearly involved in this kind of development? Is even the singing of the *cuccu* all a matter of learning? Has this any relevance to human development? Explain.

7. How does the Scotch maxim on learning at the beginning of this chapter fit in with the facts of mental development illustrated by the curves for alertness and general knowledge given in the text? Explain. How does Michelangelo's favorite maxim, *ancora imparo*, fit in with these same curves? Explain.

FILMS ON CHILD DEVELOPMENT

There are a number of excellent films available on child development. Outstanding systematic studies in this field have been made by Dr. Myrtle B. McGraw at Babies Hospital in New York and by Dr. Arnold Gesell at

the Yale Clinic of Child Development. True-false questions on three of the McGraw films are given below, and another film is described. Two of the most recent Gesell sound films are also described.

Reflex Behavior of the Newborn Infant (McGraw)[1]

This film demonstrates characteristic neuromuscular reactions of a newborn infant, including the startle reflex, the suspension-grasp reflex, crawling, stepping, swimming movements, adjustment to inverted position, and postural adjustment when pulled to a sitting position. When you are finished looking at this film, fill in the parentheses with a + for true and a − for false.

( ) 1. The development of the central nervous system is reflected in the changing behavior of the growing infant.

( ) 2. Sneezing and yawning are mature at birth.

( ) 3. The body startle or Moro reflex tends to increase for a month or so and then diminish during the next two or three months.

( ) 4. Exhibiting the suspension grasp reflex, the infant was able to hang by one hand for about 30 seconds. The reflex increases steadily to about the age of 15 months.

( ) 5. The newborn infant shows more power in the arms and shoulders than in the lower limbs.

( ) 6. When the child is held upside down flexor power is shown in the pelvic region.

( ) 7. Some rhythmic ability is shown in the legs when the infant is placed on its stomach.

( ) 8. Cross-legged stepping movements are often shown when the child is held upright.

( ) 9. When the infant is submerged in water the arms and legs are coordinated into a primitive swimming pattern.

( ) 10. Most of the activities shown probably involve a considerable measure of cortical control.

(The key is given in *Notes for Instructors*.)

Crawling and Creeping (McGraw)[2]

The normal developmental sequence from the earliest attempts to crawl on the stomach to coordinated creeping on all fours is illustrated in this

[1] *Reflex Behavior of the Newborn Infant.* Silent. International Film Bureau, 84 E. Randolph St., Chicago 1, Ill. Length, 160 ft. Price, $12.00.

[2] *Crawling and Creeping.* Silent. International Film Bureau, 84 E. Randolph St., Chicago 1, Ill. Length, 300 ft. Price, $18.00.

film. After you have seen the film, fill in the parentheses with a + for true and a − for false.

( ) 1. The developmental sequence in this film ends with the attainment of an integrated creeping pattern.

( ) 2. Two major aspects involved in the integrated creeping pattern are the attainment of the crawling posture and the development of progressive movements.

( ) 3. Rhythmical flexor-extensor movements of the legs are controlled by the cortical centers.

( ) 4. Neuromuscular development proceeds from the head end downward.

( ) 5. The reduction in the rhythmical movements of the legs probably indicates an inhibitory influence of the cortex.

( ) 6. Fairly early in the developmental process the infant learns to raise hips and shoulders at the same time.

( ) 7. Some progression appears before the knee-palm position is attained.

( ) 8. Integrated creeping cannot take place until connections are established between the neural centers controlling posture and regression.

( ) 9. Progressive movements are staccato at first.

( ) 10. Knees move forward alternately before the arms do.

(Key is given in *Notes for Instructors.*)

Growth: A Study of Johnny and Jimmy (McGraw)[3]

A three-reel college edition of the well-known twin study of motor development at Babies Hospital. This illustrates effectively the influence of exercise on the development of important motor functions at several age levels. Comparative behavior is shown during the first two years, when the twins were the subjects of special investigation, and during the following six years. The complex interdependence of practice and maturation in development is well shown.

The Growth of Infant Behavior: Early Stages (Gesell)[4]

This shows the remarkably rapid growth of behavior patterns in early infancy. The reactions of an infant at different ages are brought into com-

[3] Reel I (Creeping, sitting, walking, and erect posture). Length, 360 ft. Price, $22.00. Reel II (Swimming behavior, and ascending inclined slides). Length, 300 ft. Price, $18.00. Reel III (Manipulating pedestals to obtain a suspended lure). Length, 350 ft. Price, $21.00. Complete three-reel edition, $58.00. International Film Bureau, 84 E. Randolph St., Chicago 1, Ill.

[4] Sound. Encyclopaedia Brittanica Films, Inc., 20 N. Wacker Drive, Chicago 6, Ill. Length, 10 min. Price, with educational discount, $45.00. Rental $2.50 for the first day and $.50 per day thereafter.

parison by simultaneous side-by-side projection. The characteristics of psychological growth are further depicted by animated diagrams.

The Growth of Infant Behavior: Later Stages (Gesell)[4]

This deals with the increasing ability of the growing infant to use his hands for manipulating objects. The definite and predictable stages by which the hand grows from an almost useless organ to a dexterous and sensitive instrument are illustrated. The growth of a prenatal hand is illustrated by animated drawings.

Postural Adjustments of the Infant (McGraw)[5]

Neuromuscular development is further illustrated by the postural adjustments of the human infant when held, head downward, by the feet. The film covers several phases of development during the first 2½ years. As soon as you have seen the film, fill in the parentheses in the usual manner.

( ) 1. The development of the central nervous system is reflected in four phases of reflex behavior.

( ) 2. The first phase is the extensor phase.

( ) 3. The last phase is the relaxed phase.

( ) 4. These phases were illustrated by holding the infant upside down throughout the demonstration.

( ) 5. The child cried much of the time.

( ) 6. In the transition from the extensor phase to the righting phase neither extension nor flexion was dominant.

( ) 7. Extension dominates in the righting phase.

( ) 8. The final stage involves cortical integration and an acquiescent attitude.

( ) 9. The complete developmental process involves at least two reversals of the flexion-extension dominance pattern.

( ) 10. The complete process takes over 800 days on the average.

(The key is given in *Notes for Instructors.*)

[4] See footnote, p. 100.

[5] *Postural Adjustments of the Human Infant* (McGraw). Silent. International Film Bureau, 84 E. Randolph St., Chicago 1, Ill. Length, 180 ft. Price, $12.00.

Name_____ Section_____ Date_____

CHAPTER NINE

OBJECTIVE EXERCISES

A. True-false and Multiple-choice Questions

( ) 1. Most of the abilities of adults are dependent on both maturation and learning.

( ) 2. An instinct is an unlearned activity which enables the individual to deal competently with something in the environment without preliminary practice.

( ) 3. It is safe to assume that no learning takes place before birth.

( ) 4. Maturation is a kind of development that does not depend upon the use or characteristic activity of an organ.

( ) 5. Maturation consists largely of differentiation.

( ) 6. Differentiation of the various organs is primarily the result of: (1) heredity (2) postnatal environment (3) prenatal environment (4) obfuscation (5) interaction.

( ) 7. Maturation is essentially a preparation for use; it ceases when use begins.

( ) 8. The familiar increase in the size of a muscle through use is due to an increase in the size and number of the individual muscle fibers.

( ) 9. There is evidence that the brain cells develop through use as well as through maturation.

( ) 10. Prenatal activities are all due to maturation; postnatal activities are largely due to learning.

( ) 11. Reinforcement is the individual's check-up on the results of his own activity.

( ) 12. Reinforcement in the learning process tends to establish correct responses; it is always brought about by satisfaction from the correct responses.

( ) 13. The development of pecking behavior in chicks has been shown to be due entirely to postnatal maturation.

( ) 14. The early development of the human infant's ability to "take notice" of others is probably due to maturation in the cerebral cortex.

( ) 15. The behavioral sequences which occur in the development of balancing and creeping suggest that maturation rather than learning is the major factor involved.

( ) 16. Exercise and reinforcement may be needed to insure efficient balancing and locomotion.

( ) 17. The development of speech in the child is primarily a matter of learning rather than maturation.

( ) 18. Social development in pre-adolescent children is based exclusively on learning.

( ) 19. Puberty comes about two years earlier in girls than in boys.

( ) 20. The curve of mental growth is similar to the curve of physical growth in two respects: it flattens out during the teens and it shows a definite adolescent spurt.

( ) 21. In which of the following age periods is there the most rapid mental growth: (1) 0–2 years (2) 12–14 years (3) 14–16 years (4) 20–22 years (5) 30–32 years?

( ) 22. Persons in any age group differ more among themselves in mental ability than the average person of 70 differs from the average person of 20.

B. Matching Exercises

Answers: (1) vocabulary (2) loss (3) arithmetic (4) alertness (5) gain (6) ability (7) instinct (8) practice (9) maturation (10) intellectual (11) capacity.

( ) 23. College students usually show considerable ..... on the whole in intelligence test performance when tested as freshmen and again as seniors.

( ) 24. Between freshman and senior years college students on the average show a loss in . . tests.

( ) 25. The improvement in certain subtests of mental ability during college years is probably due more to .... than to maturation.

( ) 26. In testing the population in certain small New England towns it was found that the curve for . . . fell off much more rapidly between 20 and 60 years than the curve for general knowledge.

( ) 27. When maturation is complete, as it is during adolescence, the individual has reached his full . .

( ) 28. The . . .. abilities decline more slowly than the sensory and motor functions with advancing years.

( ) 29. The regular sequence of stages in the development of walking and talking indicates that plays an important part.

( ) 30. An is an unlearned form of activity.

CHAPTER TEN

Motives

Das Ewig-Weibliche zieht uns hinan.
— Goethe's *Faust*

Self-love, my liege, is not so vile a sin
As self-neglecting. — Henry V

We always like those who admire us; we do not always like those whom we admire.
— La Rochefoucauld

QUESTIONS FOR DISCUSSION

A. Text Questions

1. Distinguish between motive, incentive, and stimulus. How are they related? Illustrate.

2. What three factors are present in the development of motives? Illustrate.

3. Why are unlearned motives necessary for life? When a basic unlearned motive is called into play, stereotyped responses are often inadequate to meet the requirements of a changing environment. What three factors facilitate learning if the capacity to learn is present? Illustrate.

4. Mention four ways in which learning modifies unlearned motives as the individual adjusts himself to his environment. Illustrate.

5. List five motives that come under the heading of organic needs. List four motives that can be classified as emergency motives. In what important respect do the two groups differ?

6. Discuss the increase in the number of children's fears with age, with special reference to the "snake test" and the conditioned fear experiment (see Figure 28).

7. Cite some of the evidence for the mastery motive. What general proposition of importance to the science of motivation is linked to the mastery motive?

8. Cite three bits of evidence in support of the proposition that obstruction encountered in carrying out any activity calls forth more energy from the individual. Is this an unlearned motive? Is it subject to modification?

9. What are the principal kinds of objective motives? Why are they important? In what respect do they differ from the emergency motives and the organic needs?

10. What are the main features of the obstruction method for measuring animal drives? In comparing the strengths of various drives, why are the maxima used?

11. List in order of relative strength, five important drives in the white rat tested by the obstruction method. Why do you suppose the maternal drive is usually stronger than the hunger and sex drives?

12. List three incentives found effective in the laboratory. Discuss the relative merits of positive and negative criticism in getting action from others.

13. Mention five factors of importance in maintaining military morale. Cite two factors in maintaining civilian morale which are similar.

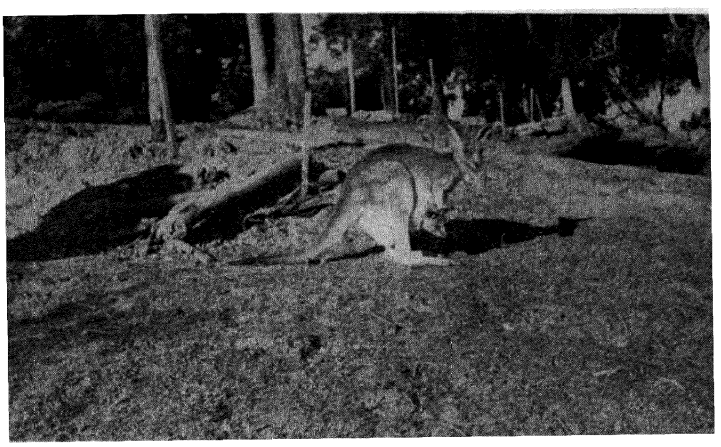


FIG. 27. Marsupial carrying young. (*Photo by H. L. Mutrhead.*)

B. General Questions

1. Maternal behavior (nest building and cuddling the young) has been induced in male rats by implanting prolactin crystals, a pituitary product, under the skin. What light do such experiments throw on the origin and urgency of the maternal motive in general? What lesson should they teach the anxious young husband who tries to persuade his wife to take less excessive care of the baby's health and more of her own?

2. Suggest some biological reason why the hunger, thirst, and maternal drives should be stronger than the sex drive in the white rat. Why should the exploratory tendency in a strange place be even stronger than hunger and sex? Give examples from your own observation of animals or humans of the maternal motive overcoming the fear and hunger motives; of hunger overcoming fear. What biological principle seems to apply in these cases?

3. Figures 7, 8, 18, 27, 30, 31, and 43 illustrate certain common motives. For each of the pictures answer the following questions: (a) What motive is represented? (b) Is this motive strong in you? (c) Is it of general importance? (d) Do you think it is partly unlearned; is it largely influenced by the social environment; or is it both?

4. George Mallory, a famous mountaineer who lost his life on his third attempt to conquer Mount Everest, the world's highest peak, was often asked why he wanted so desperately to climb it. (See Figure 3 for a suggestion of some of the risk and effort involved.) His reply was, "Because it is there!" This is obviously linked up with the mastery motive, which expresses itself in a great variety of ways. How does it express itself in your case? Is the mastery motive usually your servant or your master? Give an example of each of these conditions. Give an example from the nineteenth century of an individual who was mastered by his own mastery motive. Give a contemporary example.

5. In what way does Figure 28 illustrate the development of motives?

FIG. 28. Burmese priestess and cobra match wits. This 12-foot king cobra, one of the deadliest of reptiles, has his fangs and venom sacks intact. The scene is part of an ancient religious ritual which ends (God willing) with the priestess kissing the cobra three times on the top of the head. The secret of her art is not hypnotism but nerve, agility, and a thorough knowledge of how, when, and where the snake will strike. (*Photo by Hassoldt Davis for Denis-Roosevelt Expedition.*)

Through what stages has the priestess presumably gone since her infancy in her reactions to snakes? Are these stages typical of the development of motives in general? Discuss. Give another illustration.

6. What motivation lies back of the truth expressed in the quotation from La Rochefoucauld at the beginning of this chapter? Are you guilty in this respect?

7. Do you agree with the quotation from *Henry V* at the beginning of this chapter? Under what circumstances is the self-assertive motive desirable? What may be the motives back of self-neglect?

8. Look at the Bill Mauldin cartoon, Figure 29. What's the meaning of this? Why should he be so nasty to the poor little man? What complex of motives is at work?

FIG. 29. "Why th' hell couldn't you have been born a beautiful woman?" (*Copyright 1944, United Features Syndicate, Inc.*)

9. What motive or motives are activating the little boy with the carpet sweeper in Figure 30? Do you think the impulses to explore and manipulate, or the mastery motive, provide an adequate explanation? What about emulation or identification with some older person? Do you think this particular interest will persist in our society? Is the general motive likely to persist?

10. Descartes is the author of the following sage observation on human nature: "Good sense is, of all things among men, the most equally distributed; for everyone thinks himself so abundantly provided with it that even those who are most difficult to satisfy in everything else do not usually desire a larger measure of this quality than they already possess." Does this jibe with your own observations? How do you reconcile this with the normal distribution curve for intelligence? What motive or motives are involved? Is there a suggestion of the "sour grapes" attitude involved in some cases?

11. Can you think of any activities which involve a combination of an organic need with a pursuit or a mastery motive? Discuss.

12. Do you think that "thirst for knowledge" is most closely tied up

with some organic need, the pursuit motive, the exploratory motive, the mastery motive, some other motive, or some combination of these motives? Discuss.

13. Mention an experience in which you were temporarily "licked" by indecision. What motives were involved? Were you fatigued or under some

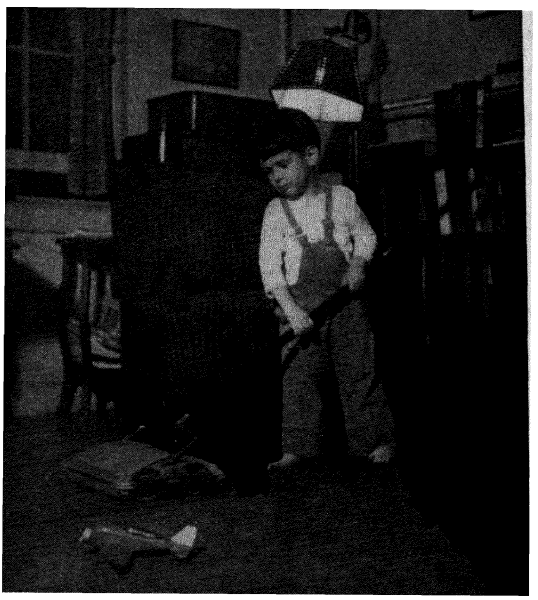


FIG. 30. "I hope I'm doing a good job."

other stress at the time? How did you finally reach a decision? Have you ever experienced the phenomenon of the goal gradient? Illustrate.

14. List five devices employed by the "supersalesman" in "breaking down sales resistance." Discuss the importance of not being stimulated to resist: why does the supersalesman rub some people the wrong way? Do you think it would be a good thing to be educated in sales resistance and resistance to propaganda generally?

15. Describe a situation in which you have participated that involved poor morale. Explain it. Describe and explain another situation which involved good morale.

C. Special Questions

1. What motives make it possible for men like Amundsen, Byrd, Sven Hedin, Peary, Scott, Peter Freuchen, and George Mallory (see *B* 4 above) to forego so much that civilization has to offer? Has the mastery motive run away with them? Are they running away from the humdrum of reality, or from something else? Are they led on by the insatiable thirst for knowledge that makes for genuine scientific discovery? Or what? Discuss. Do you

know, for example, what motives led Byrd to wait out the Antarctic winter alone in a hut buried in the snow, completely inaccessible to his party over 100 miles away at Little America? Do you find any of these explorer's motives in miniature in your own make-up? Illustrate.

2. Mention something in the lives of at least three of the following which suggests the operation of the principle that obstruction calls forth greater energy: Demosthenes, Alexander Pope, Milton, Stevenson, Napoleon, Theodore Roosevelt, Franklin Roosevelt, Beethoven, Helen Keller. Is there any proof that the suggestion is true in these cases? Would you recommend artificially inducing handicaps as a means of producing great men and women? Why?

3. Delusions of grandeur (of great wealth, power, fame, etc.) are among the most common delusions which appear in mental hospitals. To what motive are they probably linked? Can you suggest an explanation for them? Do they have any counterpart in normal persons? Explain.

4. What devices, other than the resort to force, have been employed by men like Caesar, Napoleon, Mussolini, Hitler, and Stalin to get action from others? Illustrate.

5. What do you regard as the dominant motives in the lives of any two of the following: Galileo, Leonardo da Vinci, Benvenuto Cellini, Shakespeare, Beethoven, Schubert, Newton, Napoleon, Byron, Lincoln, Dickens, Pasteur, Jane Addams, Helen Keller, Theodore Roosevelt, Wilson, Edison, Einstein? Discuss.

6. What is the translation of the classical quotation from Goethe's *Faust* at the beginning of this chapter? What significance does it have in the play? What significance does it have in everyday life?

A Film on Maternal Behavior in Decorticated Rats [1]

Dr. Frank A. Beach has produced a fascinating film contrasting the maternal behavior of normal and brain-injured rats. This shows nest-building, protection of the young from cold and attack, and the retrieving to the nest of a scattered litter. When you have seen the film put in the parentheses a + for true and a − for false.

( ) 1. Rats do not ordinarily build nests before the young are born.

( ) 2. Both the normal and the decorticated rats retreated when the rod was thrust near them.

( ) 3. If a large part of the cerebral cortex is removed the female rat shows no interest whatever in her young.

( ) 4. Even the removal of about one third of the cortex interfered with maternal behavior.

( ) 5. But such a brain-injured female protects her young by covering them with strips of paper if available.

[1] *Maternal Behavior in Decorticated Rats.* Silent. Dr. Frank A. Beach, American Museum of Natural History, New York City. Length, 300 ft. Price, $30.00.

( ) 6. The brain-injured mother builds a nest in each half of the cage.

( ) 7. Very few brain-injured females will rebuild a destroyed nest.

( ) 8. If the normal female's litter is scattered she retrieves them to the nest.

( ) 9. The brain-injured female completely lost the retrieving drive.

( ) 10. The brain-injured female's behavior is less integrated and biologically less effective.

(The key is given in *Notes for Instructors.*)

A Film on the Technique of Measuring the Relative Strength of Animal Drives [2]

This Warden and Gilbert film shows clearly a number of techniques used to measure animal drives and capacities. Of special relevance to this chapter is the demonstration of the important Columbia obstruction method for measuring the relative strength of various fundamental drives. The method is completely objective and is free from the sources of error present in earlier methods. The testing of the hunger drive in a white rat is illustrated, and a table is presented which gives the comparative strength of the hunger, thirst, sex, maternal, and other drives. (Other parts of the film dealing with maze learning in rats and the use of tools and visual discrimination in monkeys are relevant to the chapter on learning.) When you have seen the film answer the following questions.

1. What criterion was used to measure the strength of the drives?
2. Why are drives compared at their maximum strength?
3. In what two ways did the rats try to avoid a shock?
4. Why do you think that the strength of a drive could not be measured by simply increasing the strength of shock until it became prohibitive?

THE RELATION OF COMMON SATISFACTIONS AND ANNOYANCES TO COMMON MOTIVES

Purpose. To get a sample of common sources of satisfaction and annoyance, and to find their relation to common motives, organic needs, emergency and objective motives, and sensory likes and dislikes.

Materials. None.

Procedure. 1. List 10 objects, actions, situations, or sensory impressions which have been a *source of great satisfaction* or pleasure to you:

(1) .....

(2) .....

[2] *Testing Animal Intelligence.* Silent. International Film Bureau, 84 E. Randolph St., Chicago 1, Ill. Length, 460 ft. Price, $28.00.

(3) . . . . . .

(4) . . . . . .

(5) . . . . . .

(6) . . . . . .

(7) . . . . . .

(8) . . . . . .

(9) . . . . . .

(10) . . . . . .

2. List 10 objects, actions, situations, or sensory impressions which have been a *source of great annoyance* to you:

(1) . . . . . .

(2) . . . . . .

(3) . . . . . .

(4) . . . . . .

(5) . . . . . .

(6) . . . . . .

(7) . . . . . .

(8) . . . . . .

(9) . . . . . .

(10) . . . . . .

3. Classify and tally each of the items on your two lists opposite one of the three general categories below. If an item seems to fit more than one category, put it in the one with which it is *most closely* identified. (There should be a total of 10 tally marks in each column under your own individual classification.)

TABLE I

	Individual classification		Totals for the class			
Source	Satisfaction	Annoyance	Satisfaction	Rank order	Annoyance	Rank order
Persons:	. . . .	. . . .	. . . .	. . . .	. . . .	. .
Animals:	. . . .	. . . .	. . . .	. . . .	. . . .	. .
Things:	. . . .	. . . .	. . . .	. . . .	. . . .	. .
Misc.:	. . . .	. . . .	. . . .	. . . .	. . . .	. .

4. Enter the class totals in Table I. If the class is large, the process of computing the class totals may be simplified by working with a sample of, say, 10 *O*'s selected at random. Indicate the rank order of each category for each set of classifications.

5. Now reclassify each of the items in your two lists on the basis of their relation to the organic needs, motives, or esthetic tastes (sensory likes and dislikes) in Table II. In many cases the satisfaction will probably be based on a measure of success in satisfying some need or carrying out some motive. Similarly, an annoyance will probably be the result, very often, of frustration in attempting to meet some need or act on some motive. Or the satisfaction or annoyance will simply be a passive esthetic taste, a like or dislike without an activity trend. *Before classifying* any of your items, *read carefully* down the entire column headed "Related need, motive, or taste." As before, if an item seems to belong in two or more categories, put it in the one with which it is most closely related.

TABLE II

Related need, motive, or taste	Individual classification		Totals for the class			
	Satisfaction	Annoyance	Satisfaction	Rank order	Annoyance	Rank order
Hunger:						
Thirst:						
Rest:						
Association with other sex:						
Association with the young:						
Escape (emergency):						
Combat (emergency):						
Mastery, nonsocial (overcoming obstacles, etc.):						
Exploration or manipulation:						
Mastery, social. (competition, teamwork, etc.):						
Esthetic tastes (sensory likes or dislikes):						
Miscellaneous:						

6. Enter the class total for each category and its rank order for each of the two sets of classifications as indicated in Table II.

Discussion. 1. From Table I, what appears to be the most common general source of annoyance? The least common? Is the rank order the same for sources of satisfaction? Would you expect this to be the case? Explain. Is there anything in this table to support the assertion that "man is a social animal"?

2. From Table II, what appear to be the three leading sources of satisfaction? Is there any relation between them and the three leading sources of annoyance? Explain. Does any particular *group* of urges seem to dominate the others, such as the organic needs, emergency, social or other motives? Would you expect to find the order different during a war, a plague, a famine, or a drought? Explain.

3. Does the mastery motive assume any importance in Table II? Which aspect of it is the more prominent, non-social or social? Would you expect to find a difference in emphasis in a society less competitive than our own, or for a group of trappers and hunters leading relatively solitary lives in the wilds? Explain.

4. Does the order of the needs and motives approximate that of the animal drives measured by the obstruction method? If not, can you suggest an explanation in terms of the relation of deprivation to the strength of a drive, or in terms of social pressures?

5. Do you think the order of needs, motives, and tastes would be approximately the same for both sexes? (If there is a fair sample of each sex group in your class, you can investigate this matter.) Explain your conclusion.

6. Do esthetic tastes rank very high in Table II? Why are these results somewhat inconclusive? Do you think the results might vary from one socio-economic group to another? Explain.

7. Suggest one or two sources of error in the method used in this exercise for throwing light on the prevalence and strength of various motives and other urges.

Name_____ Section_____ Date_____

CHAPTER TEN

OBJECTIVE EXERCISES

A. True-false and Multiple-choice Questions

( ) 1. A motive is a set for certain activities or for seeking certain goals.

( ) 2. An incentive is a motive toward which a goal-seeking activity is directed.

( ) 3. Though some motives in the young are instinctive, any adult human motive probably includes both learned and unlearned components.

( ) 4. Which one of the following is *not* an important part of the organism's natural equipment for meeting a vital organic need when a basic unlearned motive is brought into play: (1) a persistent sensation (2) an increase in general activity (3) the power to learn (4) a purpose (5) reinforcement of any act which satisfies the motive?

( ) 5. Which one of the following is *not* one of the important ways in which unlearned motives are modified by learning: (1) goals become more specific (2) motives are combined (3) motives are resolved into their components (4) means become ends in themselves (5) new stimuli, by association, acquire power to arouse motives?

( ) 6. Which one of the following is *not* one of the three principal classes of motives: (1) organic needs (2) emergency motives (3) subjective motives (4) objective motives?

( ) 7. Which one of the following is *not* properly classified as an organic need: (1) hunger (2) escape (3) rest (4) sex (5) elimination?

( ) 8. The motive directed toward the overcoming of obstacles is largely learned.

( ) 9. The presence of prey cannot logically be said to call forth an emergency motive.

( ) 10. Exploration and manipulation are so-called "objective motives."

( ) 11. The customs of human courtship differ so widely from one culture to another that they can hardly be said to be based on an unlearned motive.

( ) 12. Most children under three show a marked avoidance of snakes.

( ) 13. The conditioned fear experiment gives us an adequate explanation of the increase in the number of children's fears with age.

( ) 14. The mastery motive is: (1) wholly learned (2) wholly unlearned (3) a fiction (4) the result of the frustrations of early childhood (5) probably based on the unlearned drive to overcome resistance.

( ) 15. Participation in group activities is a common goal primarily because it is a means to the ends of prosperity and security.

( ) 16. As measured by the obstruction method, which of the following drives evoked the largest average number of grid crossings: (1) thirst (2) sex (3) hunger (4) exploratory (5) maternal?

( ) 17. The exploratory tendency in the white rat is sometimes stronger than either the food or sex drives.

( ) 18. Children cooperate more readily in response to authoritative commands than in response to game situations.

( ) 19. Which one of the following incentives is generally *least* effective: (1) competition (2) pacemaking (3) ridicule (4) knowledge of results (5) praise?

B. Matching Exercises

Answers: (1) object (2) futility (3) gradient (4) immediate goal (5) morale (6) purpose (7) relaxation (8) output (9) "subjective motive" (10) member of a team (11) aggression.

( ) 20. The fact that an animal speeds up as it approaches the goal is known as the goal . . . . . .

( ) 21. The pacemaker, though not a competitor, acts as an incentive because he provides an . . . . .

( ) 22. The . . . . . of muscular work can be considerably increased by self-competition and pacemaking.

( ) 23. In getting action from yourself a definite . . . . . is the first requirement.

( ) 24. In the efficient operation of an army the problem of . . . . is as important as the problem of equipment.

( ) 25. The raw recruit does not have the true military morale until he has become an active . . . . . .

( ) 26. Morale is impaired by any feeling of . . . . . .

( ) 27. To maintain the active soldier's morale he must have periods of . . . . . .

CHAPTER ELEVEN

Feeling and Emotion

Seeing is believing, but feeling's the naked truth. — John Ray

Trust not to thy feeling, for whatever it be now, it will quickly be changed to another thing.
— Thomas a Kempis

QUESTIONS FOR DISCUSSION

A. Text Questions

1. What is the relation of feeling and emotion to desire? What is the relation of feeling to overt action; to the observation of facts?

2. In what two ways do pleasure and displeasure originate? Illustrate each. What is one of the greatest sources of annoyance in social life? Explain it in terms of its relation to some common motive.

3. Distinguish between sympathy and empathy. Illustrate. In what two ways does esthetic enjoyment originate? Illustrate.

4. What are the two principal components of an emotion? Give a rough general rule for identifying emotions. Is one more likely to misidentify the emotions of a child or those of an adult? Why?

5. Discuss the general results of experiments on the identification of emotions from posed facial expressions. How valuable are gesture and voice as cues for identifying emotions?

6. Discuss the value of the breathing, heartbeat, and blood pressure records for detecting and identifying emotions. Of what value is the psychogalvanic reflex for these purposes?

7. Discuss the relation of the three divisions of the autonomic nervous system to each other and to emotions in general. In the X-ray experiment what part of the cat's autonomic system was most active just before the dog was introduced? What part just after the dog appeared? How would you say the cat's heartbeat changed when the dog entered?

8. What is the relation of the adrenal glands to the sympathetic nervous system? How are they both related to violent physical activity, as in athletic contests or in combat? What were some of the symptoms of autonomic activity most commonly reported in combat?

9. What five general facts have to be taken into account in any adequate theory of emotion? Illustrate these for fear or anger. With respect to which of these facts do the emotions of grief, joy, and sex appetite differ from fear and anger?

10. What did James mean when he said that "without the bodily states", we might "see a bear, and judge it best to run . . . but we should not actually *feel* afraid. . . ."? Cite experiments of Sherrington and Cannon and others which cast doubt on the James-Lange theory.

Eisenstaedt—Pix

FIG. 31. Bowdoin house party.

11. On what does the difference between emotional and unemotional behavior depend? Discuss the usual relation between intellectual and emotional activity.

B. General Questions

1. Do you find it difficult to make a clear distinction between the three dimensions in Wundt's scheme for classifying feelings? Explain. What other difficulties do you find with the scheme? What would you suggest?

2. Give an example, not mentioned in the text, of: (a) feeling as distinguished from overt action; (b) feeling as distinguished from the observation of facts; (c) feeling being pushed into the background by observing, thinking, or doing.

3. Give two or three examples of empathy from your own experience. Do you think there is sometimes a connection between this and the esthetic appreciation of a picture depicting some activity you have experienced? Discuss.

4. Apply Darwin's theory of the origin of expressive movements to clenching the fists when angry. Do you think the individual origin of this gesture is more plausible than the racial origin? Explain.

5. Mention some reasons why the blood pressure and the breathing record canot be completely relied upon to distinguish between the innocent and the guilty. (Do you feel perfectly calm when falsely accused?)

6. If the waitress has just spilled a plate of soup over your best dress or suit, it is wise to discontinue eating for a few moments. Explain this in terms of the antagonistic relationship which exists between the sympathetic nerves and one of the other divisions of the autonomic nervous system. Give another illustration of the inhibition of one emotion by another, or of the disturbance of the functioning of some organ by intense emotion, in terms of similar antagonisms in the autonomic system.

7. The dervishes of India, and many American Indian tribes in some of their frenzied ceremonial dances, exhibit almost incredible feats of endurance. One American Indian is reported to have danced continuously for three days without food, drink, or sleep. Such feats would doubtless be impossible without the active aid of the sympathetic nervous system and the adrenal glands. Mention three examples from your own observation of feats of endurance made possible by excitement.

8. Is there any advantage in getting "keyed up" to a certain extent before an examination, or before acting in a play, or making a speech? Can this be overdone? Explain. Is this keyed-up state identical with the state of being "warmed up" in action?

9. Is there any connection between getting "warmed up" on the football field or the tennis court and getting warmed up in an examination or warmed up to writing an essay or a long-postponed letter to a maiden aunt? Can you see any connection between these phenomena and William James's famous dictum: "Life should be a series of carefully planned rushes."? Explain.

10. Examine the list of annoyances on page 344 *in the text.* Do you think that your reaction to these would always be the same? Under what conditions would you be less subject to such annoyances? More subject?

11. Consider for a minute Figure 31. Now consider the James Thurber cartoon in Figure 35. The feelings and emotions in the two scenes are somewhat different. But this need be no cause for alarm and cynicism. One scene need not degenerate into the other. Can you suggest any measures that might be taken to reduce the likelihood of such a consummation?

12. A little boy once told a sympathetic adult that he usually started to cry because of some particular sorrow but that he continued to cry because

of all the sad things that ever happened. What does this illustrate? Give another similar example.

13. Examine Figure 32, which illustrates the conditioning of an emotional breathing reaction to a sound stimulus. Can you recall any emotional reaction of your own which might be explained in conditioned response terms? Can you think of any technique for eliminating such reactions? Discuss.

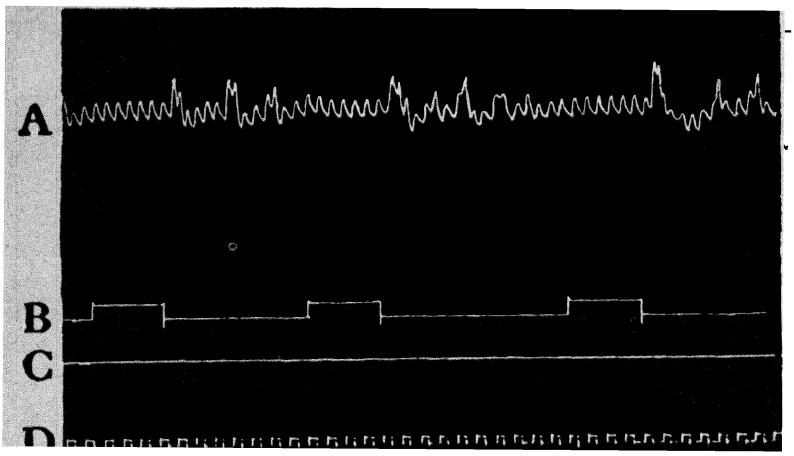


FIG. 32. Kymograph record showing the conditioned breathing reaction of a guinea pig to a tone. Line A is the breathing record. The high portions of line B indicate the presentation of the tone. Line C records the electrical shock stimulation used in conditioning (none was given during this record, which was taken after the conditioned reaction had been established). Line D indicates the time intervals in seconds. The reactions to the tone after conditioning are: (1) relatively deep inspirations at the termination of the tone, and (2) a smoothing-out of the irregular breathing while the tone is sounded. (*Reproduced from Upton, M. "The auditory sensitivity of guinea pigs."* American Journal of Psychology, *1929, 41, 412-421. By permission of the editor and author.*)

C. Special Questions

1. Napoleon is said to have subsisted at times on very little sleep. In reality he could work long hours under the pressure of emergency for several days, but he would then sleep as much as sixteen hours at a stretch. Can you suggest an explanation for this in terms of sympathetic-adrenal effects?

2. If you have any special knowledge of physiology, tell something about the physiology of fatigue, of asphyxia, of the "dull feeling" resulting from prolonged sedentary activity.

3. Do you know of any great figures who achieved fame more through the nature of their feelings and emotions than through emphasis on the "brainy life of relation"? Would you recommend the development of intense feelings and emotions as a means of attaining distinction. Explain.

4. How do you suppose Edison managed to keep healthy and mentally

alert on so little sleep? Can you explain this in terms of emotional habits?

5. Do you know of any great figures in any field who when inspired worked at a fever pitch and then suffered a subsequent period of depression? Name them. Suggest a possible physiological explanation for this. Do you think this would be a wise course for the average person to cultivate? Why? Does your own behavior ever approximate this pattern?

6. Can you reconcile the quotations from John Ray and Thomas a Kempis at the beginning of this chapter? In what sense does each express a psychological truth?

FIG. 33. Brooklyn Dodger Fans Sound Off. Brooklyn is especially noted for three things — churches, rubber plants, and the Dodgers. When speaking of the latter, however, you must include the Dodger fans (above), to whom the worst insult of all is to hint that Brooklyn hasn't a baseball team or a chance at the pennant. (*Press Association, Inc.*)

7. Contemplate the display of feelings and emotions in Figure 33. Can you identify them? This may not be a fair question, because no one who has not been brought up in Brooklyn can know what goes on inside a Dodger fan. But make a rough guess. On what expressive reactions do you base your guess?

THE DETECTION OF "GUILT"

Purpose. To demonstrate the influence of emotion on verbal and other reactions, in spite of attempted concealment.

Materials. 1. Sets of instructions for two *O*'s contained in *Notes for Instructors*. 2. Stop watch, or other watch with second hand.

Procedure. 1. The instructor selects two *O*'s and gives each an unmarked envelope. The *O*'s are instructed to leave the room, to separate and examine the contents of their respective envelopes in some quiet spot, and to communicate with no one.

2. After the *O*'s have left the room, the instructor reads a copy of the two sets of instructions to the class. One *O* has been requested to engage in some placid pastime like sitting in a corner and twiddling his thumbs. The other has been required to "participate in a crime"; that is, to read certain passages calculated to arouse some degree of emotion. No one, including the instructor, knows which one is "guilty" and which one is "innocent." It is the task of the class as "jury," with the aid of the instructor as "prosecuting attorney," to decide between them. Since the penalty for the "crime" is "hanging by the neck until dead," there is every reason for the "guilty suspect" to attempt to conceal his guilt. By the same token, there is every reason why the "innocent suspect" should avoid the appearance of guilt. *This should be made clear to the suspects* when they are called back into the "courtroom," *one at a time*, and "placed on the stand" (i.e., seated facing the instructor but turned sideways to the class. They should be instructed to cross their legs: the jury may possibly find movements of the legs or feet useful indicators of emotion).

Before the suspects are brought in, the *critical words* in the "cross-examination" list are announced to the jury. After a suspect has been placed upon the stand and duly instructed, the "cross-examination" commences. The stimulus words in the table (preceded by a "ready" signal) are "fired" at him one at a time by the "prosecuting attorney," and his response time to each is measured with the stop watch (or other watch with second hand). The jury duly records the response, the response time, and any facial expressions or other movements that may indicate emotion. When both suspects have been examined and "the state rests its case," it is the duty of the jury to weigh the evidence and decide between the suspects. The jury will take especial note of any marked delays in response and any obvious associations with the "circumstances of the crime" that are *not common associations*. Refusal to respond or continual repetition of the same response word will of course be looked upon as incriminating evidence. (Should this occur, the suspect should be so warned.)

RECORD OF "CROSS-EXAMINATION"

Stimulus	Suspect 1			Suspect 2		
	Response	Time	Remarks	Response	Time	Remarks
1. bird						
2. up						
3. barber						
4. plebiscite						
5. red						

Stimulus	Suspect 1			Suspect 2		
	Response	Time	Remarks	Response	Time	Remarks
6. wit						
7. black						
8. innocent						
9. chair						
10. dog						
11. grocer						
12. fish						
13. back						
14. table						
15. steps						
16. front						
17. lithograph						
18. thirst						
19. razor						
20. desk						
21. ink						
22. picture						
23. hair						
24. walk						
25. circle						
26. suspense						
27. cold						
28. car						
29. thumb						
30. cat						
31. iron						
32. baby						
33. soap						
34. bat						
35. banquet						
36. stew						
37. open						
38. Adolph						

4. With the suspects outside the courtroom, each juryman *independently* reaches his verdict and records it in his own notes. The suspects are then brought in and the guilty one is induced to "confess." He is asked to recall how he felt and what he thought during one or two marked delays in response. The innocent suspect is asked to report any "nervousness" which he may have felt on the stand and to try to explain it.

5. A sample of two or three jurymen are asked to explain how they reached their verdicts, right or wrong.

Discussion. 1. What percent of the jury reached the correct verdict?

2. Why should marked delays in response be significant? Do they involve something more than the time required to think up a substitute for an incriminating response which may have come to mind first?

3. What other indications of emotion were observed? Would you expect the reactions to be more marked in the case of real guilt?

4. Do you think the procedure used here in any important degree parallels a genuine trial, from the point of view of the suspect? Explain.

5. Did the innocent suspect feel at all nervous? Did any juryman render a verdict of guilty on this suspect? On what grounds? Does such a false verdict ever have a similar basis in a genuine trial?

Name_____ Section_____ Date_____

CHAPTER ELEVEN

OBJECTIVE EXERCISES

A. True-false and Multiple-choice Questions

( ) 1. Which one of the following is *not* one of the two main problems involved in analyzing an individual's desire? (1) What is he trying to say? (2) What is he trying to do? (3) What is his internal state?

( ) 2. Which one of the following dimensions was *not* included by Wundt in his scheme for classifying emotions: (1) pleasantness-unpleasantness (2) excitement-release (3) expectancy-release (4) excitement-numbness?

( ) 3. Feeling can occur without overt action, and overt action can occur with a minimum of feeling.

( ) 4. In observation sensations are taken as indicators of facts, while in feeling we take them as an unanalyzed sensation mass.

( ) 5. The pleasure derived from stimuli is always dependent upon the arousal of desire.

( ) 6. Which one of the following causes for disliking a person is most frequently mentioned by college students: (1) homeliness (2) pessimism (3) conceit (4) excessive optimism (5) introversion?

( ) 7. Empathy is a form of imitation.

( ) 8. It seems probable that all esthetic enjoyment is pleasant past associations.

( ) 9. Emotional sets are usually more specific than feeling sets.

( ) 10. An emotion when present in someone else can best be identified in terms of which *two* of the following: (1) blood pressure (2) external situation (3) psychogalvanic reflex (4) overt response (5) breathing record?

( ) 11. Darwin held that baring the teeth in expressing scorn is a survival from the days when our prehuman ancestors fought with their teeth.

( ) 12. With respect to the expression of emotions actors and ordinary adults strive toward the same goal.

( ) 13. The general character of emotion is well depicted in facial poses, though the finer shades of emotion are not readily identified.

( ) 14. The tone of voice is considerably less expressive than the face in conveying emotion.

( ) 15. The breathing record is a more sensitive indicator of emotions than the blood-pressure record.

( ) 16. Lying can often be detected experimentally because the blood pressure curve for lying has a unique pattern about 80 percent of the time.

( ) 17. The sympathetic and upper divisions of the autonomic system have opposite effects on the stomach and also on the heart.

( ) 18. There is a brain center for the autonomic system in the hypothalamus, a part of the interbrain, which is also believed to play an important part in emotion.

( ) 19. It has been shown by means of X-rays that the churning movements of the stomach and intestines cease during anger.

( ) 20. Adrenin reinforces and prolongs the physiological changes produced by the sympathetic nerves.

( ) 21. In anger and energetic fear we find a set toward a certain type of overt activity and an organic state which is a preparation for intense muscular activity.

( ) 22. Sex appetite fits the pattern suggested by the analysis of anger and fear, though the organic states involved are different.

B. Matching Exercises

Answers: (1) central theory (2) "as if" (3) peripheral theory (4) interbrain (5) sets (6) trunk (7) cerebral cortex (8) emotion (9) spinal cord (10) sensations (11) brain.

( ) 23. According to the James-Lange theory a conscious emotion is a mass of .....

( ) 24. Sherrington showed that loss of sensations from the interior of the ..... produced no obvious change in the dog's behavior.

( ) 25. The reactions of the woman with the broken neck indicates that emotional experience can arise in the .....

( ) 26. Subjects given a dose of adrenin report having an ..... emotion.

( ) 27. The experimental evidence on the James-Lange theory is against the .....

( ) 28. The difference between emotional and unemotional behavior depends on the degree to which the ..... dominates the lower parts of the brain.

CHAPTER TWELVE

Choice, Conflict, Frustration

To strive, to seek, to find, and not to yield.
— Tennyson

And thus the native hue of resolution
Is sicklied o'er with the pale cast of thought,
And enterprises of great pith and moment
With this regard their currents turn awry,
And lose the name of action. — Hamlet

But now I am cabin'd, cribb'd, confined, bound in
To saucy doubts and fears. — Macbeth

If we were without faults, we should not take
so much pleasure in remarking them in others.
La Rochefoucauld

Mediocrity has no greater consolation than in
the thought that genius is not immortal.
— Goethe

QUESTIONS FOR DISCUSSION

A. Text Questions

1. What is the relation of will to choice? What two elements does will, as exemplified by purposive behavior, include? Illustrate. What is the relation of choice to emotions?
2. Draw diagrams of compromise and vacillation responses and explain. Illustrate some "double-sign alternatives."
3. Explain and illustrate the proposition that choice is not always determined by the strongest motive.
4. In what two ways is the word *frustration* commonly used? What is meant by "frustration tolerance"? What kind of person is likely to have little frustration tolerance?
5. Illustrate four common kinds of frustrating situations.
6. Give three examples of "unthinking emotional reactions" to frustration. Outline the mechanism of repression.
7. Explain and illustrate the mechanisms of rationalization and projection. Why are these grouped together?

8. What common purpose do sublimation, compensation, regression, and fantasy serve? Illustrate each.

9. Is complete altruism the goal of social adjustment? Explain. Are normal people free from maladjustments? Distinguish roughly between neuroses and psychoses.

10. What points of agreement are there in the theories of Freud, Adler, and Horney on the origin of neuroses? What are some of the major differences in emphasis?

11. What is the main principle which applies in helping a maladjusted child? In helping an adult to adjust, what is wrong with "giving advice"? What are the two main steps in psychotherapy?

12. Illustrate how hypnosis may sometimes be used, with a good subject, in both of the main steps in psychotherapy. What are the limitations of this method?

13. What use is made of "free association," of "transference," and of "reeducation" in psychoanalysis? What are some of the limitations of psychoanalysis?

14. Outline two modifications of psychoanalysis introduced by Adler and other partial followers of Freud.

15. Outline the theory of nondirective counseling.

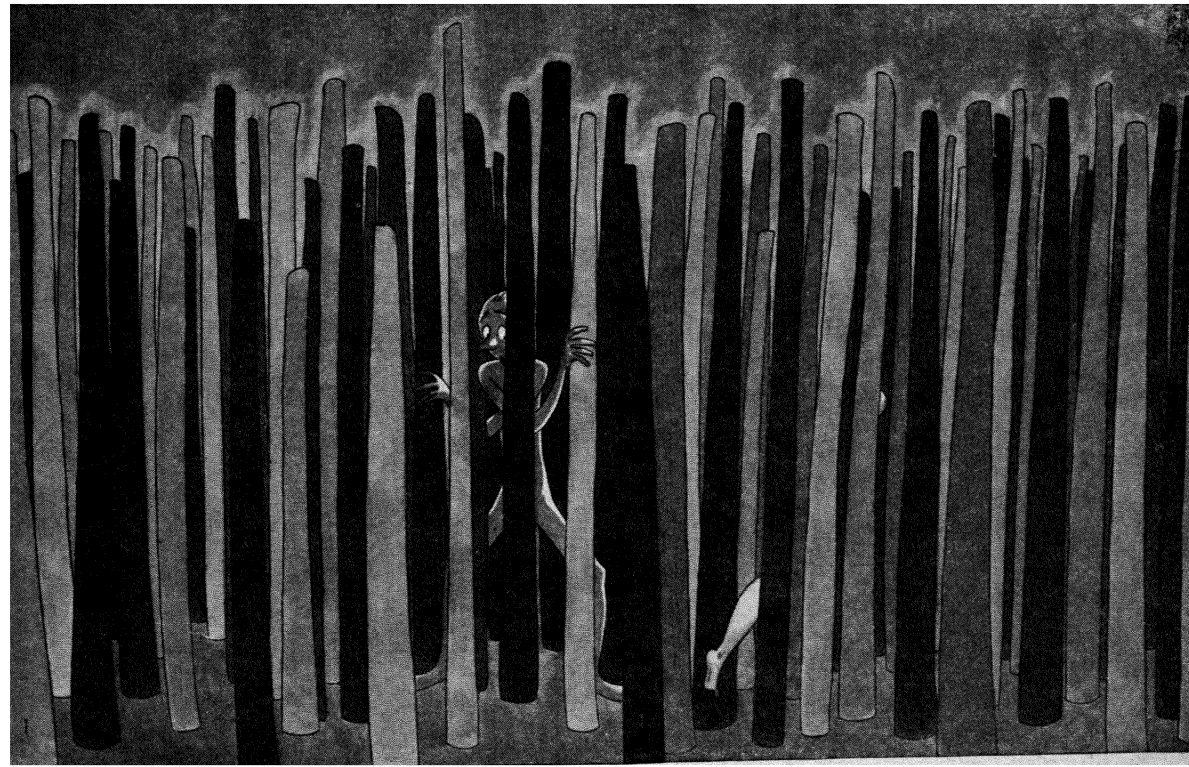
B. General Questions

1. The quotation from Tennyson's *Ulysses* at the beginning of this chapter was inscribed on the cross erected to the memory of Captain Robert F. Scott and his men near the scene of their death on one of the pioneer Antarctic expeditions. You know people who characteristically tackle obstacles in this indomitable manner and others who react with the vacillation described in the classical quotations from *Hamlet* and *Macbeth*, just below the line from Tennyson. (See also Figure 34.) Which is the better approach to difficulties? Does either necessarily indicate good adjustment? Discuss.

2. Give an example from your own experience in which a weaker motive won out over a stronger motive. Explain.

3. The behavior of the playground bully can often be explained in terms of the thwarted self-assertion that results from classroom inferiority. The street urchin's insulting remarks addressed in a guarded undertone to the policeman's back, and the excessive dignity assumed by the waiter who has just slipped on a bit of mashed potato are further examples of behavior resulting from the frustration of the ego. Give two examples from your own observation of queer emotional behavior resulting from the thwarting of the mastery motive.

4. Descartes is the author of the following sage observation on human nature: "Good sense is, of all things among men, the most equally distributed; for everyone thinks himself so abundantly provided with it that



Indecision

From It's a Long Way to Heaven, *copyright 1945 by Abner Dean, and reproduced by permission of Rinehart & Co., publishers.*

FIG. 34

even those who are most difficult to satisfy in everything else do not usually desire a larger measure of this quality than they already possess." Does this jibe with your own observations? How do you reconcile this with the normal distribution curve for intelligence? What motives or frustration mechanisms are involved? Is there a suggestion of the "sour grapes" attitude involved in some cases?

5. Interpret the quotation from La Rochefoucauld at the beginning of Chapter 18 as an example of rationalization.

6. Examine the Thurber cartoon of domestic bliss in Figure 35. What common type of reaction to frustration does this so vividly exemplify?

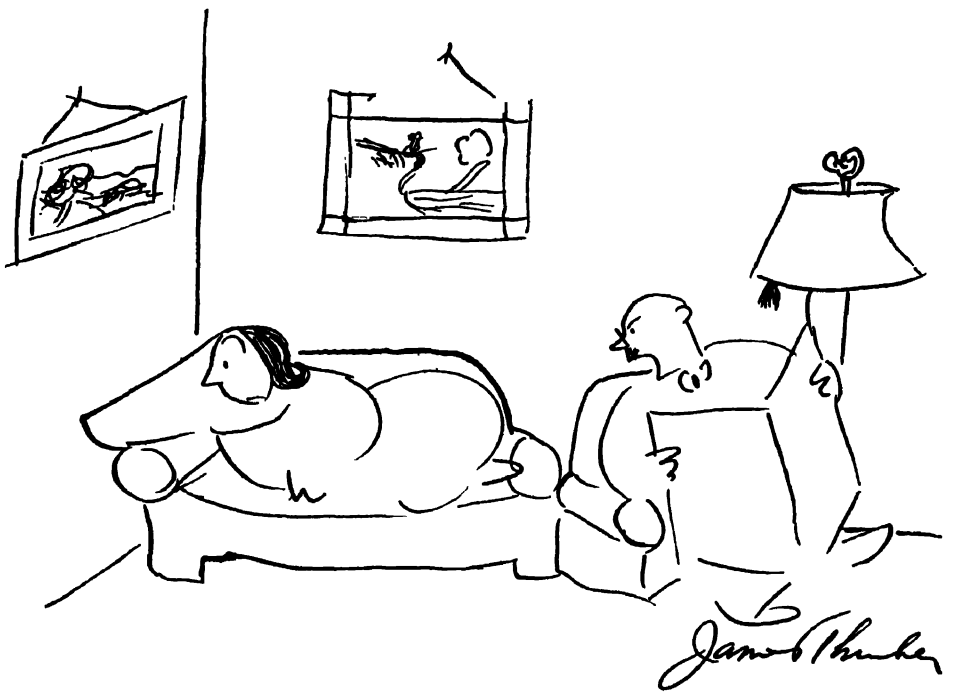


FIG. 35. "Well, who *made* the magic go out of our marriage — you or me?" (*Permission James Thurber and* The New Yorker. *Copyright The F–R Publishing Corporation.*)

7. What frustration mechanism is implied in the quotation from La Rochefoucauld at the beginning of this chapter?

8. Can you cite from your own observation an example of apparent regression?

9. Interpret the quotation from Goethe at the beginning of this chapter in terms of some common way of reacting to frustration.

C. Special Questions

1. What is the setting of the quotation from *Hamlet* at the beginning of this chapter? Was there reason for indecision in this case? Was Hamlet characteristically vacillating? Answer the same questions for the *Macbeth* quotation.

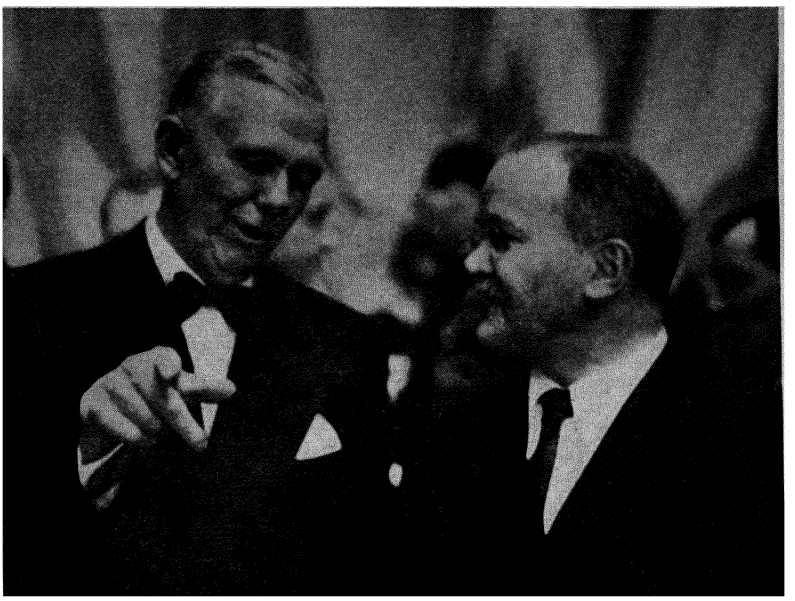


FIG. 36. Marshall explains a point to Molotov. (*Press Association photo.*)

2. Give an example of something approximating sublimation in your own life or from your own observation.

3. The following commentary on dreams from Plato's *Republic* contains an astonishing number of concepts usually credited to Freud's pioneering insight. For how many of them can you give an appropriate Freudian label?

> Certain of the unnecessary pleasures and instincts are deemed to be unlawful; every man appears to have them, but in some persons they are subjected to the control of law and reason; and, the better desires prevailing over them, they are either wholly suppressed, or reduced in strength and number; while in other persons these desires are stronger and more abundant. I mean particularly those desires which are awake when the reasoning and taming and ruling power of the personality is asleep; then the wild beast in our nature, gorged with meat and drink, starts up and walks about naked, and surfeits at his will; and there is no conceivable folly or crime, however shameless or unnatural — not excepting incest and parricide — of which such a nature may not be guilty. . . . But when a man's pulse is healthy and temperate, and he goes to sleep cool and rational, . . . having indulged his appetites neither too much or too little, but just enough to lay them to sleep, . . . he is then least likely to be the sport of fanciful and lawless visions. . . . In all of us, even in good men, there is such a latent wild beast nature, which peers out in sleep. — Plato's *Republic*

4. If you interpret *compensation* dynamically, as in this chapter, not merely as a negative correlation, as in Chapter 3, to how many of the following does the term apparently apply: Alexander Pope, Napoleon, Byron, Stevenson, Beethoven, Milton, Demosthenes, Steinmetz, Theodore Roosevelt, Franklin Roosevelt, Helen Keller?

5. Strong desires unsatisfied in reality sometimes gain partial satisfaction in imagination. This phenomenon is less common in adults and less common in people who lead vigorous active lives; but, if the need is great enough, even the most rugged individuals may react in this way. We have a good illustration of this in an experience of F. S. Smythe, one of the most stalwart "war horses" that ever took part in a Mt. Everest expedition. Smythe and his companion E. E. Shipton had spent two nights in "Camp 7," a frail tent perched precariously on the side of a snow-swept ridge higher than any camp has ever been pitched, before or since — over 27,000 feet above sea level. Even at much lower altitudes the rarefied air causes deterioration to take place rapidly (see Figure 1). An additional day at this extreme elevation, which a blizzard had forced upon them, had left them in a weakened condition; yet they set out in a desperate attempt to reach the summit. As they inched their way up the steeply sloping slabs the glacier beckoned coldly 10,000 feet below! They "roped up" to reduce the hazard; it was good to know that if one slipped there was a chance the other might keep him from answering the glacier's call. Not far from camp severe stomach cramps forced Shipton to turn back. Smythe was left to go it alone. Four tortured hours brought him exhausted to the base of the summit cone, to an altitude of 28,000 feet, the highest point ever reached on foot by any man, with the possible exception of George Mallory, who disappeared on this same ridge several years before. Realizing at last that the mountain was more than a match for him, he sank down to regain what strength he could for the perilous return trip. Taking from his pack a bar of chocolate, he carefully broke it in the middle, turned and offered one half to Shipton — *who wasn't there!* Smythe had seen him turn back nearly four hours before; and yet, so great was his need for companionship and support, he had convinced himself that Shipton was with him all the time, ready to give the necessary pull on the rope if a slip should occur.

Have you ever experienced such a temporary delusion under great stress? Was it an expression of the demand for security or of some other motive? Did it clear up when the need ceased? Do you know of any case involving more lasting delusions? Under what motivating and other conditions did they occur? What is the difference between a normal and an abnormal delusion?

6. Can you see any suggestion for good adjustment in the familiar admonition of Polonius to his son on the eve of his departure to distant parts: "This above all: to thine own self be true, and it must follow as the night the day, thou canst not then be false to any man."? Explain.

7. Study the faces of Secretary Marshall and Foreign Minister Molotov in Figure 36. Is there anything to indicate the conflict and frustration that lay back of the Moscow Conference and which later flared up in public discussion? How do men who deal with affairs of such importance to their own countries and to mankind preserve their equanimity and health most of the time? Do you know of important exceptions?

THE EFFECT OF GROUP COMPETITION ON VERBAL AND EMOTIONAL REACTIONS

Purpose. To investigate the effect of group competition on verbal and emotional reactions.

Materials. Stop watch or other watch with second hand. Pencils for recording scores and other reactions in the form below.

Procedure. 1. Two teams of three members each are to be selected by the class. They should be chosen as representatives either of the two sexes or of two different college classes, say sophomores and juniors.

2. The task on which they are to compete for the "honor" of the group they represent is similar to the task used in Chapter 3, but there are some changes. Each competitor is to say as many words beginning with a given letter as he can in 45 seconds. The initial letter to be used will be announced by *E* just before giving the starting signal. The following rules are to be observed: (a) all words must start with the assigned letter; (b) proper names not allowed; (c) improper names or other words not allowed; (d) both singular and plural of the same word not allowed; (e) words having different meanings count only once. The observers will make *silent* note of violations of the rules and report to *E* after each competitor finishes a trial. No credit will be given for items which violate the rules.

3. There will be four trials in all. The scores are to be entered in the form below. *E* will announce the individual scores and the team totals *after all six competitors have completed trial 1, not before.* He will announce the scores and team totals again after *all* have completed trial 2, and so on.

4. The observers are to make careful note of any signs of emotion, including prolonged inability to think of words, while each person is performing. They are to look especially for any increase in emotion in the later trials. These observations are to be recorded in the blanks headed "Comments."

Results. Let each observer consider his own comments and decide which three individual contestants showed the most marked signs of emotion in trial 1 and also which team as a whole showed the most marked signs of emotion in trial 1. Then let each observer decide which three individuals and which team showed the most marked *increase* in emotion in the later trials. Finally, by a show of hands the group opinion on these four points is to be determined. These decisions are to be recorded in the blanks provided.

RECORD OF RESULTS

Trial 1

Team A	Score	Comments
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____

Team total: _____

Trial 1

	Team B	Score	Comments
1.			
2.			
3.			

Team total: _____

Trial 2

	Team A	Score	Comments
1.			
2.			
3.			

Team total: _____

Trial 2

	Team B	Score	Comments
1.			
2.			
3.			

Team total: _____

Trial 3

	Team A	Score	Comments
1.			
2.			
3.			

Team total: _____

Trial 3

	Team B	Score	Comments
1.			
2.			
3.			

Team total: _____

Trial 4

Team A	Score	Comments
1.		
2.		
3.		

Team total: _____

Trial 4

Team B	Score	Comments
1.		
2.		
3.		

Team total: _____

SUMMARY OF OBSERVATIONS

	Your opinion	Class opinion
Three most emotional competitors in trial 1:	_____ _____ _____	_____ _____ _____
Most emotional team in trial 1:	_____	_____
Three competitors showing greatest increase in emotion:	_____ _____ _____	_____ _____ _____
Team showing greatest increase in emotion:	_____	_____

Discussion. 1. What were the most common signs of emotion?

2. Was there anything in the competitive situation which would constitute conflict? Explain. Was there any specific reaction to this?

3. Was there anything in the competitive situation that would constitute frustration, such as one team being constantly behind? Was there any evidence that the losing team showed more emotion?

4. Was there evidence of such mechanisms as aggression, compensation, sour grapes attitude, etc.? Discuss.

FILMS ON THE EXPERIMENTAL PRODUCTION AND CURE OF NEUROSES IN CATS

Dr. Jules H. Masserman of the University of Chicago has produced a truly remarkable four-part film on the role of frustration and conflict in the development and cure of experimental neuroses in cats. Parts II and III, selected for review here,[1] deal with "the effects of environmental frustrations and intensification of conflict in neurotic cats" and "experimental diminution of neurotic behavior in cats". When you have seen them, put in the parentheses a + for true and a − for false.

Part II: Frustration and Intensification of Conflict

( ) 1. The cats were not trained to open the food box in response to a light signal.

( ) 2. The normal cats did not resist removal from the experimental cage.

( ) 3. If the lid of the food box is held down (mechanical frustration) the cat stops trying to open it on the signal after 5 or 10 trials.

( ) 4. A barrier between the cat and the food box is also used as a form of mechanical frustration.

( ) 5. Some cats who show no neurotic signs to the other forms of mechanical frustration are disturbed if they are permitted to open the food box on signal but find it empty.

[1] *Dynamics of an Experimental Neurosis* (Masserman), Psychological Cinema Register, Pennsylvania State College, State College, Pa. Length: Part II, 388 ft.; Part III, 466 ft. Price: Part II, $24.50; Part III, $29.00. Rental, each $1.25 per day.

( ) 6. Most cats are not disturbed by a harmless blast of air if it does not constitute a feeding frustration.

( ) 7. When a feeding conflict has been set up cats may refuse to enter the cage despite days of starvation.

( ) 8. The feeding conflict always causes them to become restless and irritable rather than immobile.

( ) 9. Emotional disturbances in the prolonged feeding conflict increase as hunger increases, reaching a peak typically on the second day.

( ) 10. Forced proximity to the food box did not increase the anxiety conspicuously.

( ) 11. In one case the neurotic cat was so anxious to escape around the barrier that it did not take advantage of the open side of the cage.

Part III: Experimental Diminution of Neurotic Behavior

( ) 1. The neurotic behavior was previously induced by a conflict between hunger and fear of a physically harmless frustrating stimulus.

( ) 2. The symptoms produced may be irritability, agitation, specific "phobic" (blind fear) reactions, and self-starvation.

( ) 3. Increasing the hunger drive always increases the symptoms.

( ) 4. It is sometimes possible to reestablish the feeding reaction in a self-starved cat by gentle retraining in the experimental cage.

( ) 5. One neurotic cat would not eat unless petted.

( ) 6. Cats retrained by the "transference" method often became disturbed anew when the light was flashed on.

( ) 7. In an attempt to break the conflict the hunger drive was increased by forced proximity to the food.

( ) 8. There was no evidence that the position of the movable barrier really made any difference in the cat's eating reaction.

( ) 9. The newly acquired feeding responses were at first abnormally rapid and impulsive in character.

( ) 10. Even though partly cured the cats could not be induced to eat while the air blast was on.

(The scoring key is given in *Notes for Instructors.*)

Name_____ Section_____ Date_____

CHAPTER TWELVE

OBJECTIVE EXERCISES

A. True-false and Multiple-choice Questions

( ) 1. Will, as exemplified by purposive behavior, includes both motive and foresight.

( ) 2. The increased effort called forth by obstacles should not properly be regarded as will.

( ) 3. Difficult choices probably always involve "double-sign alternatives."

( ) 4. Decision, following vacillation, tends to be reinforced by self-assertion and identification.

( ) 5. When two motives are in conflict, choice is determined by the stronger motive.

( ) 6. It is the individual who must be satisfied, rather than any particular one of his motives.

( ) 7. The word *frustration* sometimes refers to a response and sometimes to a stimulus.

( ) 8. Insecure people have more "frustration tolerance" than those who are secure.

( ) 9. Which one of the following is *not* stressed as a common frustrating situation for a motivated individual: (1) blocked by impersonal obstacle (2) blocked by another person (3) conflict of positive motives (4) conflict of positive and negative motives (5) conflict of negative motives?

( ) 10. Team work is the happiest solution of the conflict between the tendency to dominate in some and the resistance to it in others.

( ) 11. Remorse cannot be properly regarded as a form of frustration.

( ) 12. In our society the egoistic impulses are more commonly thwarted than most physiological motives.

( ) 13. Common unlearned emotional responses to frustration are angry aggression and anxiety.

( ) 14. If repression is complete a basic motive may be eliminated from the system.

( ) 15. The "sour grapes" attitude is a form of rationalization.

( ) 16. An important goal of social adjustment is an attitude of complete altruism.

( ) 17. The normal person is free from maladjustments.

( ) 18. Most modern psychiatrists feel that the role of conflict in the origin of the neuroses has been greatly exaggerated.

( ) 19. Freud held that maladjustments originate in the child's thwarted demands for love and pleasure.

( ) 20. Adler has stressed the thwarted demand for security and other psychoanalysts have stressed the thwarted demand for superiority as central in the development of the neuroses.

( ) 21. Which one of the following is *not* usually employed in psychoanalysis: (1) free association (2) transference (3) hypnosis (4) reeducation (5) recall of childhood memories?

( ) 22. Nondirective counseling is a form of therapy which lays stress on the patient's "style of life."

B. Matching Exercises

Answers: (1) compensation (2) rationalization (3) compulsion (4) fantasy (5) projection (6) obsession (7) regression (8) aboulia (9) sublimation (10) mechanism (11) repression.

( ) 23. When a person finds in others undesirable attitudes which he fails to recognize in himself, this is called . . . . .

( ) 24. Making artificial excuses for one's failures is called . . . . . .

( ) 25. The device of escaping from a sense of failure by finding substitute goals is known as . . . . . .

( ) 26. The psychoanalysts believe that an "intolerable" sense of anxiety or an extremely painful memory may be banished into "the unconscious" by means of . . . . . .

( ) 27. The development of outstanding ability because of a sense of inferiority is known as. . . . . .

( ) 28. When failure causes one to revert to an earlier and lower "level of aspiration," we speak of . . . . . .

( ) 29. When the individual fails in real activity, he may get some satisfaction by resorting to . . . . . .

( ) 30. A device for defending the ego against frustration is called a . . . . . .

CHAPTER THIRTEEN

Observing

The eye is not satisfied with seeing.
— Ecclesiastes

There is some soul of goodness in things evil,
Would men observingly distil it out.
— Henry V

QUESTIONS FOR DISCUSSION

A. Text Questions

1. What are the two principal steps in observing? Illustrate. What has selectivity to do with either?

2. Name and illustrate the principal factors in the stimulus that give it an advantage in attracting attention? What are the principal factors in the organism that determine the direction of attention? Illustrate.

3. How can attention be mobile even when it is sustained? What is the most important factor in sustained attention? Illustrate. What does "inattention" usually mean?

4. Show what is meant by the statement that we usually observe objects rather than stimuli. Suggest an explanation for this in terms of the *W—S—Ow—R— W* formula.

5. What is the relation between signs, meaning, and experience? Distinguish between symbols and signals. Use the Thurber sketch in Figure 39 to illustrate "reduced cues." (Do you think that the factors involved in social perception are essentially different from those in general perception?)

6. Pick out a single sentence from the text which gives the key meanings to the terms *ambiguous signs* and *perceptual constancy*. Illustrate.

7. How do *figure and ground* phenomena illustrate both selectivity and combination in perception? Illustrate this in both the visual and auditory fields.

8. Name three *stimulus* factors that make for ease of grouping in dot and similar assemblies. Name three *internal* factors that make it easy to combine parts into whole figures.

9. What principles of observation are employed in the art of camouflage? Illustrate. What two types of tests are used to measure accuracy of perception? Illustrate. What is meant by the "span of apprehension"?

10. State and illustrate Weber's law. Does it apply equally well to perception in all fields? Does it apply equally well for all degrees of stimulus intensity? Is the ratio which indicates the just perceptible difference the same for the different senses?

11. Illustrate constant and variable errors. Explain how constant errors may vary. Which type of error is easier to correct? Why?

12. Define illusion. List four common causes of illusions. Illustrate each. What cues for the improvement of observation can we get from the study of illusions?

13. Discuss the improvement of observation, with special reference to scientific observation.

B. General Questions

1. Explain, in terms of at least two important concepts dealt with in this chapter, why the quotation from *Ecclesiastes* at the beginning is appropriate. Illustrate.

2. Why is the Thurber sketch of the predatory rabbits, Figure 37, attention-arresting? What famous definition of news does this suggest? Which of the kinds of stimuli that have an advantage in attracting attention is involved here? Mention one or two practical applications of this principle. Do you think the humor involved tends to make the impression more lasting? Do you think the prospect of more humor to come helps to sustain attention once it is aroused? What practical conclusion for teaching, advertising, or general social relations can you draw from this?

3. Refer again to the Thurber sketch of the perplexed husband, Figure 39. Here the cartoonist has packed into a few meager visual stimuli a wealth of meaning. Would these stimuli have the same meaning to a child? How do they acquire meaning for the adult? Give two other illustrations of the way in which sensory signs acquire meaning, using some field other than the visual.

4. In what way do the pictorial intelligence test items based on the Soglow cartoons, Figure 4, require social perception? Would you expect social and esthetic perception to show any correlation with intelligence? Discuss.

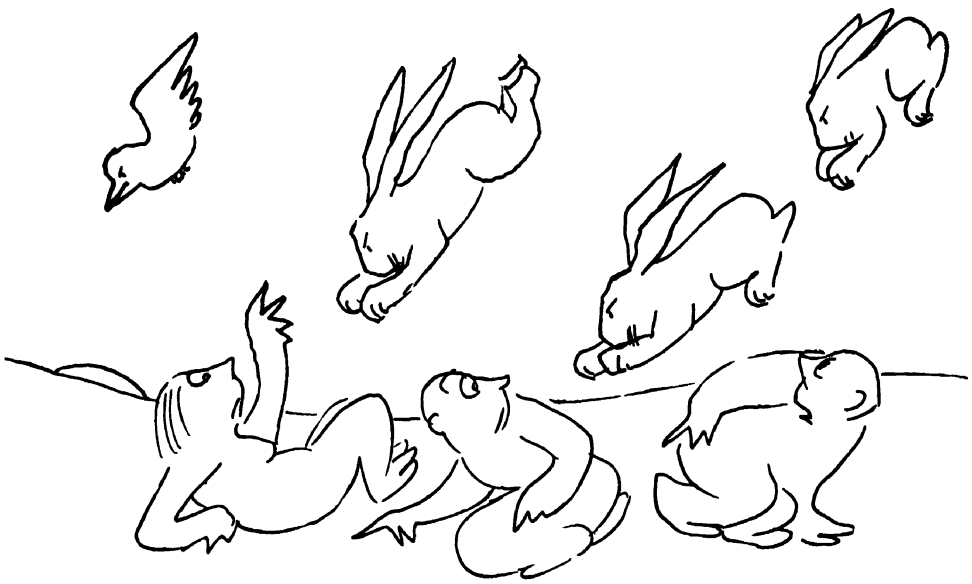
5. Imagine a doctor, a lawyer, and a policeman as witnesses of an automobile accident. Use their reactions to illustrate the principle of selectivity in observation. Has this same principle anything to do with the operation of prejudice in social perception? Discuss.

6. Imagine a long-legged man with a stomach ache sitting for several hours in one of the confining seats of an upper gallery at the opera or a musical comedy. Use this unfortunate man as an illustration of the concepts of figure and ground *in three different senses.*

7. Can you see any relation between the concept of figure and ground as it appears in the visual and auditory fields and such things as context in reading and set in listening to an anecdote with a surprise ending? Explain.

8. Figure 49 in Chapter 17 demonstrates that recall is usually creative. In what sense is perception creative? Give one or two examples of this.

9. Consider some full-page magazine advertisement, an impressive illuminated street sign, an airplane's skywriting, or some other effective advertisement. What are some of the factors which have an advantage in arresting your attention? Are there any factors common to two different advertising mediums?



RABBITS DESCENDED UPON THEM

FIG. 37. "World War XII, as everybody knows, brought about the collapse of civilization. Men, women, and children became lower than the lower animals. Emboldened by the pitiful condition of the former lords of the earth, rabbits descended upon them." (*Reproduced from James Thurber's* The Last Flower, *by permission of Harper & Brothers, publishers.*)

10. A story is told of a tired musician who slept soundly while a friend played a classical piano piece with great vigor in the same room. But when his friend struck a false note he came to with an oath. Which of the kinds of stimuli that have an advantage in arresting attention does this illustrate? Give illustrations from your own observation of three other kinds of stimuli that have a similar advantage.

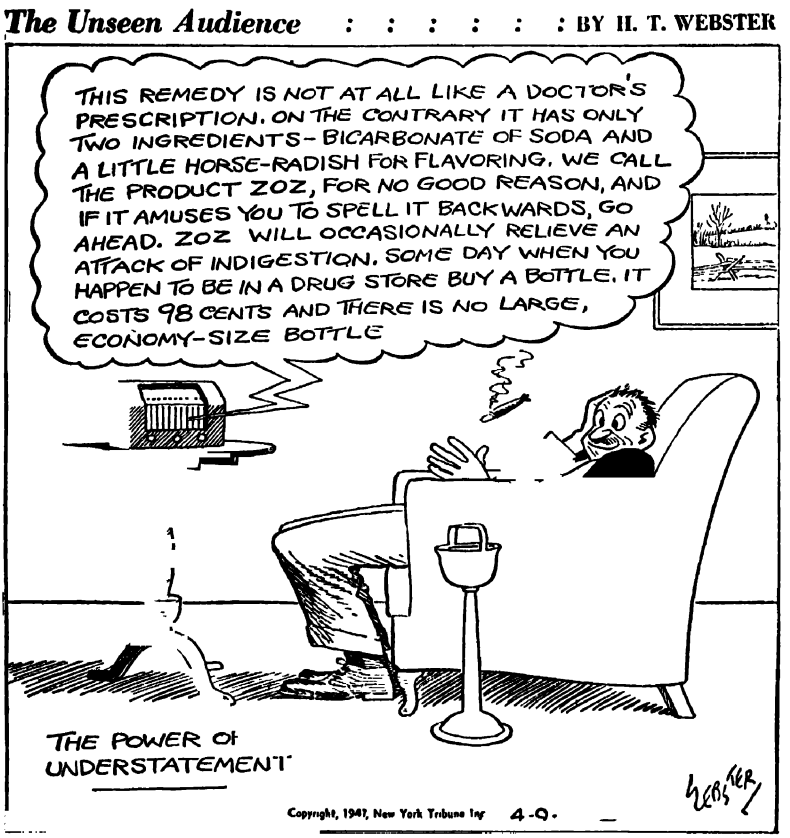
11. Consider the H. T. Webster cartoon in Figure 38. Why should the representative of "The Unseen Audience" be so completely nonplussed? Which of the factors of advantage in attracting attention is involved here?

12. Suggest one or two practical situations in which the span of apprehension would be of importance. Do the same for Weber's law.

13. Examine Figure 41, which shows convincingly the influence set can have on visual perception. Give one or two examples of false perceptions based on wrong preparatory sets. Give an example of preparatory set aiding perception. Does this latter have anything to do with scientific observation?

C. *Special Questions*

1. Recall the incident of Archimedes' inspiration in the public bath (page 17). This simple observation led to the formulation of Archimedes' principle, an important canon in the mechanics of liquids. An equally simple event — being hit by a falling apple as he lay asleep under a tree — led Isaac Newton to the formulation of the law of gravitation. Which of the



Courtesy H. T. Webster and *The New York Herald Tribune*
FIG. 38.

principles of observation do the reactions of these great thinkers illustrate: the active nature of perception, the dependence of observation upon past experience, the principles of selection and combination, the sharpening of observation by the formulation of a good question, or what? Discuss.

2. Using as an illustration the musical score for some instrument, show the relation between signs, meanings, and experience.

3. How do the relations between the melody and the harmony of a song, or between the theme of a symphonic work and the rest of the orchestration, illustrate the principle of figure and ground? Can you apply the concept of perceptual shifting to your reactions to a round, a fugue, a piece of polyphonic music, or some work with complex orchestration?

4. It is said that the city dweller often finds it difficult to sleep for the first few nights after his arrival in the country even though there is much less noise. Can you explain this in terms of one of the principles of attention? Give another illustration of this same principle.

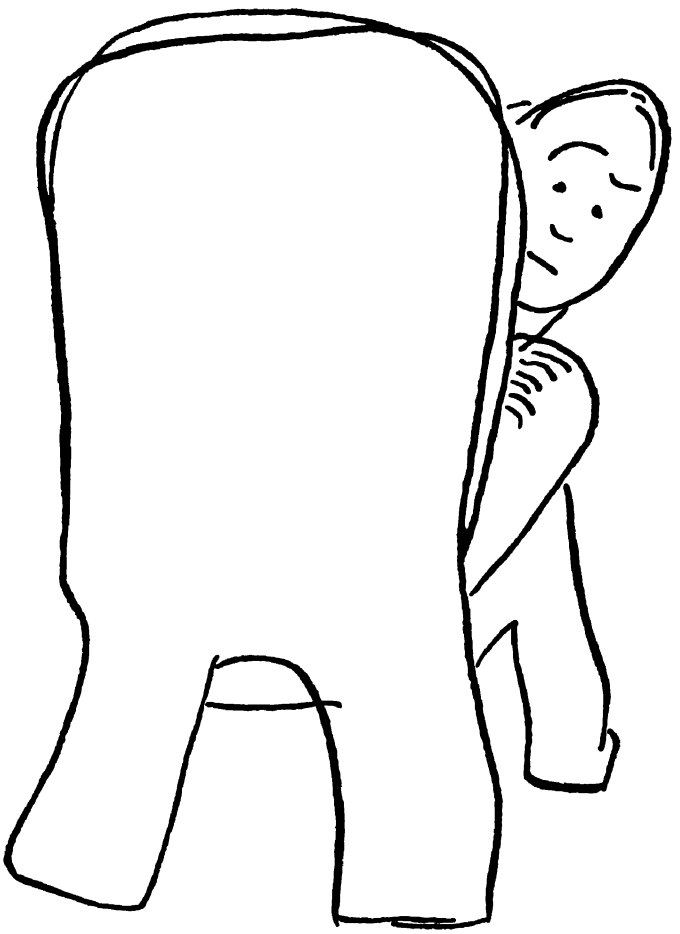


FIG. 39. Here we have the inquisitive and perplexed husband trying to fathom the inscrutable mystery of his wife's behavior. (*Reproduced from* Is Sex Necessary? *by James Thurber and E. B. White, by permission of Harper & Brothers, publishers.*)

5. What are the requirements for a good observer in any three of the following cases? Tell whether they are probably unlearned capacities, matters of special training, or a combination. When training seems to be the major factor, suggest the nature of the training which would seem to be required. Book reviewer, dramatic critic, music critic, sports writer, general reporter, proofreader, accountant, inspector in an automobile or other factory, traffic cop, detective, poet, painter, historian, doctor, lawyer, teacher, physicist, chemist, biologist, astronomer, geologist, anthropologist, sociologist, business man.

6. Outline the steps in some great discovery in medicine, the natural

sciences, or history, and show how any of the principles of observation presented in this chapter apply.

7. Can you identify the products whose radio plugs are being satirized in the H. T. Webster cartoon in Figure 38?

GESTALT DEMONSTRATION [1]

Purpose. To give a simple but convincing demonstration of the important Gestalt principle that the perception of the whole configuration may strongly influence the nature of the perception of the parts.

Materials. Pencil and ruler.

Procedure. Observe that ABC is an isosceles triangle, in which AC = BC. Check this with your ruler. Now draw very carefully the lines AF, DC, BE, and FE, thus making a large parallelogram divided into two smaller parallelograms of unequal size.

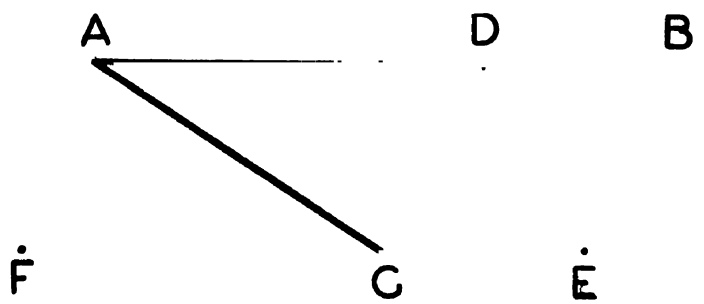


FIG. 40.

Results. Do the lines AC and BC seem to be equal any more? If not, which seems smaller?

Discussion. You will observe that the line which now seems smaller is the diagonal of the smaller parallelogram and the line which now seems larger is the diagonal of the larger parallelogram. Each of these two equal lines was originally identified with the same triangle. Now each is identified with a different parallelogram. They were originally parts of the same configuration, or Gestalt. Now they are parts of different configurations and, consequently, they have changed their character. Can you give any examples of similar phenomena?

FACTORS IN OBSERVATION

Purpose. To demonstrate certain factors in observation.

Materials. Watch with second hand, paper, pencils, and a picture listed in *Notes for Instructors* to be used as an observation test.

Procedure. 1. The entire class will act as *O*'s. Each *O* makes ready to examine the designated picture but *keeps it covered* until told to look at it. Just before the signal to start is given the *O*'s read through the following

[1] The central phenomenon in this demonstration was first reported by Sander.

instructions with the instructor *twice:* "You will have just *2 seconds* in which to examine the picture. Remember as much about it as you can."

2. The *O*'s cover up the picture *promptly* when the time is up. Then each *O* writes down as much as he can remember about the picture.

3. Step 1 is repeated in detail, except that in the instructions to be read twice by all, the time is changed to *40 seconds.*

4. When time is called the picture is covered up as before. With the previous recalls also covered, each *O* again writes down as much as he can remember about the picture in *6 minutes.*

5. The class is then divided into two groups of equal size, to be designated "the control group" and "the experimental group." While the control group, instructed not to look at or discuss the picture or the recalls, remains behind, the other group is taken outside the room and given certain instructions contained in *Notes for Instructors.* The instructed group returns at once and all *O*'s repeat Step 3 without modification.

6. Step 4 is next repeated without change.

7. Each *O* then checks his recalls for the two 40-second observation periods against the picture and scores them, giving himself 1 credit for each correct noun, adjective, verb, or adverb in his accounts of what the picture contained.

8. Each *O* gets the ratio of his score on the second 40-second observation test to his score on the first 40-second test, correct to two decimal places. This may be called "the effect ratio." (If larger than 1.00, it indicates a gain in items observed; if less than 1.00, a loss.) Then the average effect ratio is obtained for each of the two groups.

RESULTS

	First score (I)	Second score (II)	Effect ratio (II/I)
Individual *O*:	.....	.....	.....

	Control group	Experimental group
Average effect ratio:	.....	.....

Discussion. 1. Compare the recalls for the initial 2-second observation period with those of the two longer periods taken together. Is there any difference in the *character* of the observations? (Get reports from 5 or 6 *O*'s on this.) Is there anything to suggest that the brief initial observation dealt more commonly with the picture *as a whole* and that the later observations placed more emphasis on the *details?* Discuss. What general principle of observation does this suggest?

2. Does a comparison of the average effect ratios for the two groups give any evidence which suggests that the special instructions to the experimental group improved observation? (The instructor at this point will read the instructions which he earlier gave to the experimental group.) Discuss. What suggestion does this give for increasing the efficiency of observation in general?

3. In experimental work it is generally desirable to equate experimental and control groups in terms of initial ability, among other things. If this had been done in this demonstration in terms of scores on the first 40-second observation test, how would the general purpose of the demonstration have been interfered with? In what way does the use of the effect ratio partly eliminate the need for equating the two groups?

4. If the two groups are very small, and if the difference between the average effect ratios is also small, can we place much reliance on the results? Explain the advantage of large experimental groups in terms of the effect on chance errors.

5. Suggest some improvements on the procedure used in this demonstration, assuming no restrictions in time or equipment.

Name_____ Section_____ Date_____

CHAPTER THIRTEEN

OBJECTIVE EXERCISES

A. True-false and Multiple-choice Questions

( ) 1. The process of observation involves the preparatory step called *perception* and the final step called *attention.*

( ) 2. Poor observation is responsible for much that is often attributed to poor memory and to poor understanding of other people's feelings.

( ) 3. Attention, rather than perception, involves both the selection and combination of stimuli.

( ) 4. Which one of the following is *not* one of the kinds of stimuli that have an advantage in attracting attention: (1) intensity (2) change (3) difference (4) interest (5) repetition?

( ) 5. Few children are inattentive in the absolute sense.

( ) 6. When attention is sustained by interest it loses its mobility.

( ) 7. In general, we observe objects rather than stimuli.

( ) 8. Stimuli serve as signs which acquire meaning through experience.

( ) 9. Perception is a process of using signs, or "cues," so as to get at their meanings.

( ) 10. A *symbol* has a more realistic connection with its meaning than a *signal* has.

( ) 11. Shifting perception is approximately the opposite of "perceptual consistency."

( ) 12. Figure-finding is a natural process which plays an important part in perception.

( ) 13. Figure-ground perception may occur in the auditory field.

( ) 14. Which one of the following is *not* an important stimulus factor that makes for ease of grouping: (1) proximity (2) similarity (3) meaning (4) continuity?

( ) 15. Camouflage makes use of protective coloration and the proximity factor.

( ) 16. Grouping is likely to reduce the span of apprehension.

( ) 17. Variable errors in perception are easier to correct than constant errors.

( ) 18. Constant errors may vary with the conditions.

( ) 19. Weber's law states that equal differences are equally perceptible.

( ) 20. Weber's law is approximately correct for all kinds of perceived qualities, if the intensity of the stimulus is not very low.

( ) 21. Relative differences in illumination are easier to perceive than relative differences in weight. This constitutes an exception to Weber's law.

( ) 22. In which of the following kinds of perception is accuracy greatest: (1) visual brightness (2) lengths of lines (3) lifted weights (4) intensity of sound?

B. Matching Exercises

Answers: (1) railroad engineer (2) sensation (3) architect (4) interest (5) perception (6) expectancy (7) reinforcement (8) total impression (9) question (10) familiarity (11) perimetry

( ) 23. An illusion is a false .....

( ) 24. The "proofreader's illusion" is due to habit and .....

( ) 25. Ghost-seeing and burglar-hearing illusions are due to ....

( ) 26. The Müller-Lyer illusion is due to an unanalyzed .....

( ) 27. Illusions of the kind typified by the Müller-Lyer illusion are of practical importance to the .....

( ) 28. More than anything else good observation depends on worthwhile .....

( ) 29. We can learn from the scientists that a good ..... is a great sharpener of observation.

( ) 30. Attention is sustained when some genuine interest is aroused and the principle of ..... comes into play.

CHAPTER FOURTEEN

The Sense of Sight

We see things not as they are, but as we are.
— H. M. Tomlinson

A wise man sees as much as he ought, not as much as he can. — Montaigne

QUESTIONS FOR DISCUSSION

A. Text Questions

1. Why does the painter have to distinguish between the colors of objects and the colors of lights? How does this relate to the distinction between sensation and perception?
2. In what ways are the structure and function of the camera and the eye similar? What difference is there in the method of focusing?
3. How are the rods and the cones distributed in the retina? What are their functions? Explain the relation between vitamin A and night blindness. How has this been demonstrated?
4. What are the two principal types of eye movement? What are the two principal subtypes? Describe the behavior of the eye in reading.
5. In what three ways may a light stimulus vary? What, roughly speaking, are the corresponding variations in the visual stimulus? What elaboration of the simpler concept is necessary in the case of brightness? In the case of hue?
6. What is the essential difference between mixing pigments and mixing colored lights on the stage or mixing colors on a "color wheel"? Illustrate.
7. How do complementary colors differ from other "disappearing color pairs"? Illustrate. What are salient hues? Illustrate. What is meant by primary colors? Which three are basic in the Young-Helmholtz theory?
8. Describe the two kinds of color blindness. In what group of people is color blindness most common? What causes it?
9. Mention two kinds of visual contrast. What is the relation between one of these, negative afterimages, and complementary colors?
10. What are some of the visual cues which enabled Wiley Post to pilot his plane around the world on his record-breaking flight with only one eye? What factors would have made it easier with two eyes?

11. Describe an experiment which demonstrates the importance of distance set in the perception of object size.

12. What is meant by color constancy? Illustrate. What is the connection between illumination set and color constancy? How can this be demonstrated?

13. What two factors are involved in the perception of motion in motion pictures?

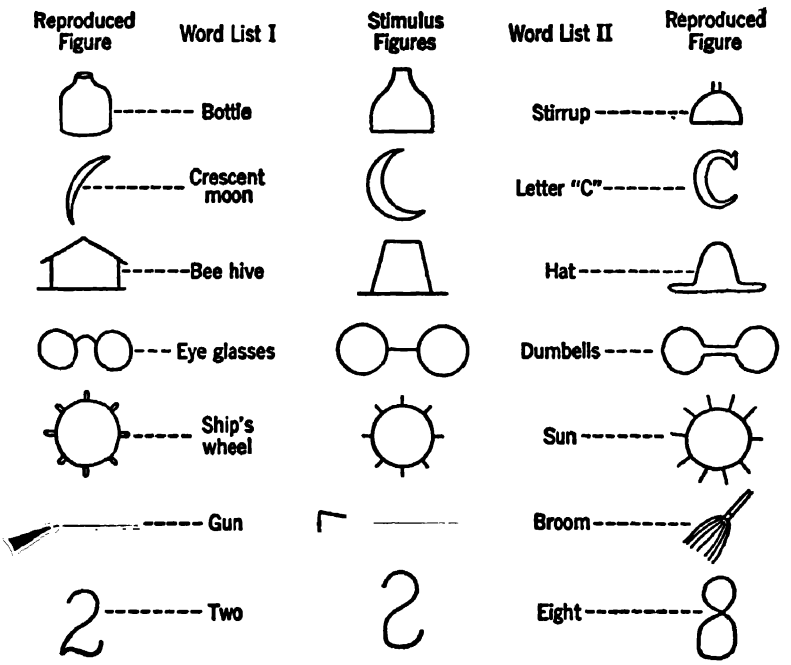


FIG. 41. The effect of set on visual perception. In the middle column are the stimulus figures. The reproductions to the left and right were drawn from memory after the subjects had heard announced the names of objects, which the stimulus figures were said to represent, from either one or the other of the two word lists. The influence of the sets so established is quite obvious. (*Reproduced from Carmichael, Hogan, and Walter*, Journal of Experimental Psychology, *1932*, *15*, *by permission of the editor.*)

B. General Questions

1. Examine Figure 41 which demonstrates neatly the influence of set on visual perception. The set in this case was induced by simple verbal stimuli of negligible emotional import. It is easy to see how a set with a powerful emotional backing might distort perception to a significant degree. Can you give an illustration from your own experience of a perception warped so as to fulfill some strong desire or so as to conform to some strong expectation? Would you expect this sort of thing more when tired or under the influence of some other stress? What precautions might be taken to minimize such distortions?

2. If the eye is so very much more sensitive when dark-adapted, why do we not make more systematic use of "twilight vision"?

3. Can you see any practical importance in having some systematic checkup on the extent of night blindness in this modern world? Do you know of any connection between excessive use of alcohol and vitamin deficiencies? Do you think it would be a good idea to institute special penalties for persons caught driving at night under the influence of a vitamin deficiency?

4. Why do you suppose Byrd chose orange trail markers for use in the Antarctic snows? Did it have anything to do with the greater sensitivity of the eye to lights of medium wave length? Why didn't he choose yellow in this case? Was the question of contrast also a factor to be taken into consideration? Explain.

5. What colors or color combinations are most commonly used in advertising? Suggest some principle governing the selection of colors for this purpose. Are psychological factors the only ones involved?

6. What general principle emphasized in this chapter does the quotation from Tomlinson at the beginning of the chapter illustrate?

7. Do you think the distance judgments of young children are as accurate as those of adults? Explain. Is there any connection between the implications of Stratton's lens experiment and the perception of distance? Explain.

8. Which of the cues for distance perception are illustrated in the mountain scene in Figure 42? Explain.

9. What are some of the size illusions employed by Hollywood in the construction of scenery? Would these be possible if the audience could make the proper distance set? Explain.

C. Special Questions

1. Do you know anything about the color sensitivity of some of the common photographic films, and how they compare with the eye in this respect? Can you draw sketches to show the relative sensitivity to the various spectral hues for some common orthochromatic film, some common panchromatic film, and for the eye?

2. Do you see any connection between the perception of unity in an architectural masterpiece, like St. Mark's in Venice or the Taj Mahal, and the perception of movement? Explain.

3. Draw a sketch locating the visible spectrum on a wave-length scale running from "hard" X-rays at one end to radio waves at the other.

4. What color filters are most commonly used in daylight photography? What are the principles involved? Why are different filters needed in artificial light? (Make use of your answers to Question 1 above, if you like.)

5. If you have had any experience with painting, mention some of the fine points of pigment mixing. Tell, for example, how you would bring out the difference between the blue of the sea and the blue of the sky, or how a gray may be made more dynamic than by merely mixing black and white.

6. Astronomers used to locate new stars and other changes in the celestial scene by holding two pictures of the same area of the heavens side by side, pictures taken at different times. They had learned the trick of fusing, or combining by superimposing, the two images which thus fell on their two retinas. If there had been no appreciable change in the heavens, the fusing would be complete. But if any heavenly body had moved significantly with respect to the rest of the field of view, this stood out from the rest of the scene. What principle of binocular vision was involved? What piece of apparatus mentioned in the text operates on this principle?

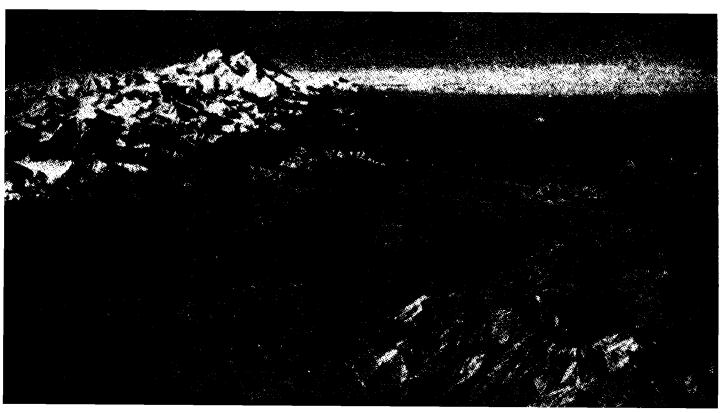


FIG. 42. Mount McKinley from the air. The photograph was taken from an altitude of 10,000 feet about fifty miles from the peak. (*Photo by H. Bradford Washburn, Jr. Courtesy* Appalachia.)

7. Helen Keller before the age of two became deaf, dumb, and blind. Name some of the accomplishments which her heroic spirit made possible. What devices did she employ as substitutes for vision? How does this illustrate the difference between seeing and perceiving?

8. Name two of Milton's great works which were written after he became blind. Is there any evidence of visual imagery in these? Do you suppose this would have been possible if he had been born blind?

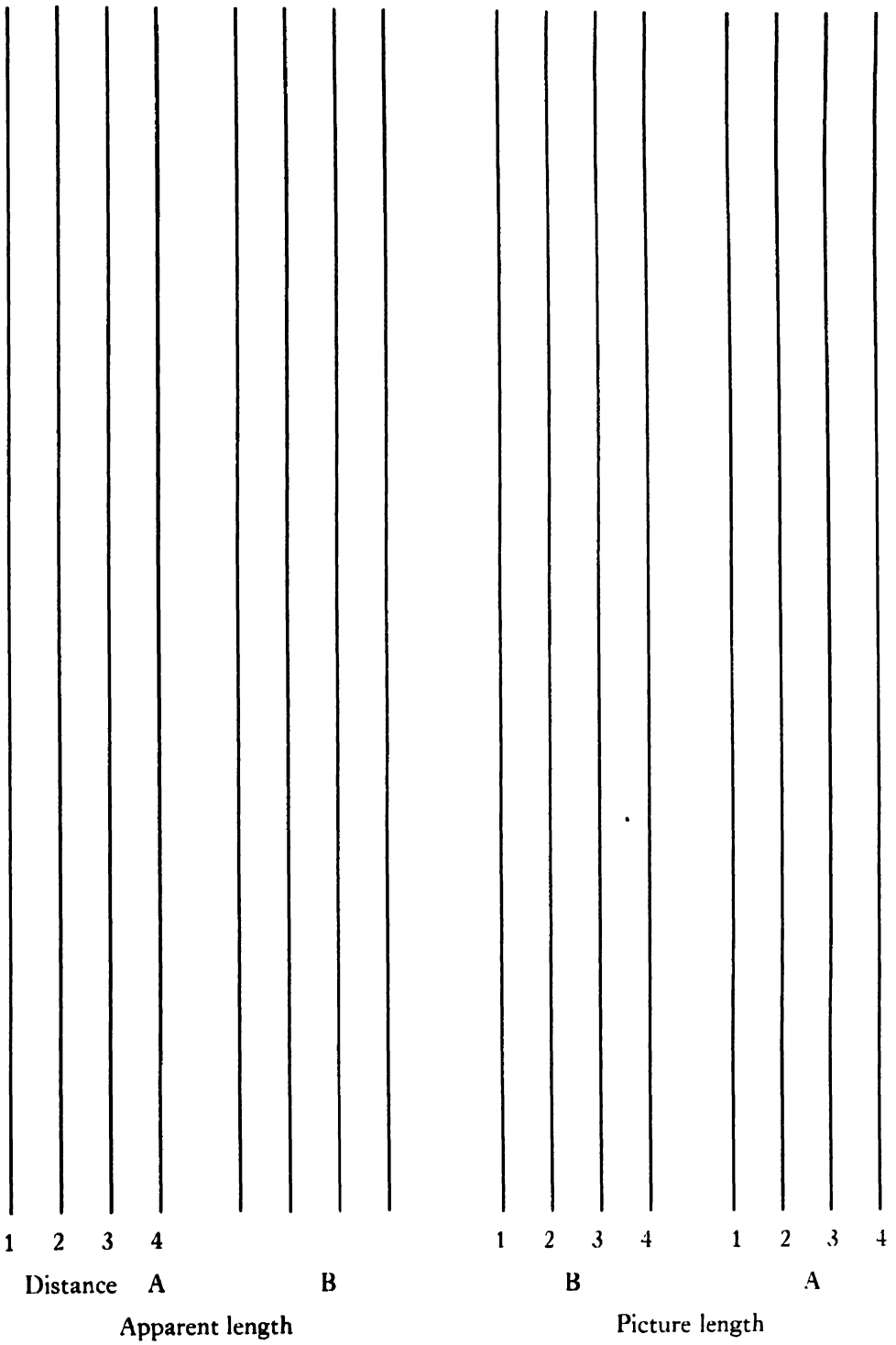
9. Interpret the quotation from Montaigne at the beginning of this chapter. Are both seeing and perceiving implied here? Explain.

SIZE CONSTANCY

Purpose. To bring out the difference between "object size" and "picture size," when objects are seen at different distances.

Materials. Four wooden rods, or similar objects, having the same diameter but different lengths, all less than 8 inches. The rods are numbered for identification in a random order. These rods are provided by *E*. Each *O* needs a ruler or a substitute which can be made by folding a sheet of paper several times in the same direction. Each *O* thus has a straight ruler at least 8 inches long.

Record Sheet



Procedure. 1. *E* exposes the rods one at a time in any stated order. As each rod is being shown, *O* marks off the same length on his ruler and also on the appropriate numbered line in the Record Sheet above. *O* will of course make some error, but that is of no consequence in this experiment, the purpose being simply to have *O* record how long the rod *seems* to him.

2. When all the rods have been shown, *E* has the *O*'s change seats so that those in front go to the rear and vice versa. He exposes the rods again but in a different order, not telling their numbers till the *O*'s have indicated the four lengths on the Record Sheet.

3. While the *O*'s remain in their new positions, they use their rulers to measure the "picture length" or projection of each rod. *E* holds the rod vertically and *O*, holding his ruler vertically and at arm's length, marks off with his thumb the distance along the ruler covered or subtended by the rod. *O* transfers this length to his Record Sheet. In this way the "picture length" of each rod is shown on the Record Sheet.

4. The *O*'s now resume their original seats and again measure and record the "picture length" of the rods.

Results. By the term "apparent length" is meant the length of a rod as it "seemed" to *O* in the first part of the experiment. *O* has recorded the apparent length of each rod as seen from two different distances, and the question is whether the apparent length of a given rod was the same in the two cases. On the whole was the apparent length of a rod slightly smaller when seen from the greater distance?

If time permits the rods may be passed around and their actual length indicated on the student's paper for comparison with the judged or apparent length. But the main question is whether the apparent length of the same rod was approximately the same when seen from different distances.

With regard to the "picture length," the question is whether this too is approximately the same when the object is viewed from different distances, or whether there is a relation between distance and "picture length."

Discussion. A quick demonstration of the main facts can be had by asking the *O*'s to indicate on their rulers the apparent length of a rod, and to hold all the rulers up for everyone to see. Probably the indicated lengths are much the same in spite of the different distances from which the rod is seen. Then each *O* marks off on his ruler the "picture length" of the same rod and holds his ruler up for all to see. In this case the distances marked off on the rulers will probably differ widely according to the distance of the *O* from the rod.

1. How does the "picture size" change with the distance of *O* from the object?

2. How does the apparent size differ with the distance of *O* from the object?

3. Does the retinal size of different objects correspond to their apparent size or to their "picture size"?

4. In absolute size, how must the retinal image of a given rod compare with the "picture size" as measured in this experiment?

5. What other factor besides the retinal size must operate in producing the apparent size?

A Film on Visual Phenomena and Research Techniques [1]

Dr. G. M. Gilbert has planned and photographed a film which neatly demonstrates several important phenomena in visual perception, together with the apparatus used to produce or record them. In particular, the film demonstrates the "phi phenomenon," two common optical illusions, color constancy, eye movements in reading, and perception span. It ends with a digit-span test which can be taken by the class. After you have seen the film, fill in the parentheses with a + for true and a − for false or partly false.

( ) 1. Any motion picture is an illustration of the phi phenomenon.

( ) 2. A "movie" is made up of a series of still pictures separated by intervals of darkness.

( ) 3. In the laboratory demonstration of the phi phenomenon the three main stages shown were alternation, apparent movement, and simultaneity.

( ) 4. Flicker fusion illustrates the essential similarity between visual stimuli and conscious experience.

( ) 5. The critical frequency is the rate of revolution of the color wheel at the point of fusion.

[1] *The Experimental Psychology of Vision* (Gilbert). Silent. International Film Bureau, 84 E. Randolph St., Chicago, Ill. Length, 460 ft. Price, $28.00.

( ) 6. The critical frequency is higher for brighter illumination or for smaller contrast between the light and dark phases.

( ) 7. Illusions are examples of the dynamic nature of the perception process.

( ) 8. In the Zöllner illusion two lines of the same length appeared to be unequal in length.

( ) 9. Ambiguous figures illustrate the perceptual identity of figure and ground.

( ) 10. In the matter of brightness and color constancy, the mind is able to distinguish *actual* object characteristics even though the *apparent* stimulus characteristics are misleading.

( ) 11. The fixation of the eye on a visual object is called a "saccadic" reaction.

( ) 12. The number and duration of the fixation periods per line depend upon the difficulty of the reading matter.

( ) 13. A tachistoscope was used to measure the span of attention.

( ) 14. The perception span is not subject to improvement with practice.

(The scoring key is given in *Notes for Instructors.*)

A Sound Film on the Anatomy and Physiology of the Eye [2]

With the collaboration of the Department of Ophtha'mology of the New York University College of Medicine and the Columbia University College of Physicians and Surgeons, Encyclopaedia Britannica Films, Inc. has produced a highly recommended sound film on the anatomy of the eye and the mechanics of vision. The demonstrations and discussions cover eye movements, the light receptors, the field of vision, night blindness, double vision, nearsightedness and farsightedness, astigmatism, learning how to judge distance, and other topics. When you have seen the film answer the following questions.

1. Indicate the functions of the principal parts of the eye. What are the major elementary structures in the retina?
2. What is the explanation of night blindness?
3. Explain double vision.
4. By means of diagrams bring out the difference between nearsightedness and farsightedness.
5. How is the lens of the eye affected in astigmatism? How can glasses correct this?
6. What are the principal factors involved in learning how to judge distance?

[2] *Eyes and Their Care.* Sound. Encyclopaedia Britannica Films, Inc., 20 N. Wacker Drive, Chicago 6, Ill. Length, 10 min. Price, with educational discount, $45.00. Rental, $2.50 for the first day and $.50 per day thereafter.

Name_____ Section_____ Date_____

CHAPTER FOURTEEN

OBJECTIVE EXERCISES

A. True-false and Multiple-choice Questions

( ) 1. We must distinguish between "visual sensation," or the seeing of objects, and "visual perception," or the seeing of light.

( ) 2. Nerve impulses from the eye pass through the optic nerves and the interbrain to the occipital lobes of the cortex, where perception takes place.

( ) 3. Which of the following pairs does *not* bring out an analogy between the eye and the camera: (1) retina — plate (2) choroid coat — focusing mechanism (3) cornea — lens (4) iris — diaphragm?

( ) 4. The fovea, "the center of clear vision," contains only cones. The cones have color vision.

( ) 5. Cones are more active than the rods in twilight vision.

( ) 6. Vitamin A deficiency has been shown to reduce the sensitivity of both rods and cones, but the reduction was greatest for the rods.

( ) 7. The wave length of red light is shorter than that of violet.

( ) 8. "Brightness" refers to the sensation, "brilliance" to the stimulus.

( ) 9. Hue depends upon the wave length of the stimulus, saturation upon the mixture of the wave lengths.

( ) 10. Brilliance depends upon both the energy of the stimulus and its wave length, the eye being most sensitive to yellow.

( ) 11. Two wave lengths which when acting together give a white or gray sensation are called complementary.

( ) 12. All the colors, including white, can be obtained by mixing three of the following colors. Which one is *not* essential: (1) red (2) yellow (3) green (4) blue?

( ) 13. Red-green blindness is really yellow-blue vision; total color blindness amounts to rod vision.

( ) 14. Which of the following colors is *not* basic in the Young-Helmholtz theory: (1) red (2) orange (3) green (4) blue?

( ) 15. We get maximum saturation in successive contrast when we look steadily at a color and then shift to the complementary color.

( ) 16. The convergence movements of the eyes are of two sorts, saccadic and pursuit.

( ) 17. In reading, about what percent of the time is the eye approximately motionless: (1) 10 (2) 30 (3) 50 (4) 70 (5) 90?

( ) 18. The stereoscope tends to increase the normal binocular depth effect.

( ) 19. Which one of the following factors which aid in the perception of distance is *not* available to the painter: (1) perspective (2) aerial perspective (3) double images (4) partial covering (5) shadows to indicate relief?

( ) 20. Images thrown upon the retina by the lens of the eye are upside down.

( ) 21. Distance set is to object size as illumination set is to object color.

( ) 22. When there is opportunity for distance set the observer tends to perceive the size of objects in proportion to their stimulus size.

B. Matching Exercises

Answers: (1) green (2) objects (3) sensitivity (4) stimulus (5) compromise (6) light (7) yellow (8) bluish green (9) illumination set (10) color wheel (11) spectrum.

( ) 23. "Color constancy" is usually a . . . . between stimulus color and object color.

( ) 24. The realistic painter tries to reproduce the . . . . color.

( ) 25. A colored object is one that absorbs . . . . . selectively.

( ) 26. We do not perceive object color correctly without a correct . . . . . .

( ) 27. Motion pictures afford a striking example of the tendency of the organism to see . . . . . and not simply the stimulus.

( ) 28. The . . . . . of the eye is greater in dim light than in bright light.

( ) 29. Red and . . . . . are complementary colors.

( ) 30. Purple has no place in the . . . . . since it is a sensation that cannot be aroused by any single wave length.

CHAPTER FIFTEEN

The Other Senses

Sugar is not so sweet to the palate as sound to the healthy ear. — Thoreau

We have two ears and one mouth that we may listen the more and talk the less. Zeno

QUESTIONS FOR DISCUSSION

A. Text Questions

1. What are the two main problems involved in the study of any of the senses? Use some aspect of the sense of hearing as an illustration.

2. If you first swallow your pride, you should be able to think of the human body as a hollow cylinder or thick-walled tube. Locate the three classes of sense organs in the appropriate regions of the cylinder.

3. List and illustrate four factors upon which the excellence of a sense organ depends.

4. Name the four primary cutaneous sensations. Are there known sense organs corresponding to each of these? What three of these sensations would be involved if a hot poker were applied to the skin? How is it possible to get more than four varieties of skin sensation? Illustrate.

5. Discuss the phenomenon of temperature adaptation. In what other senses does adaptation take place?

6. How did the "sixth sense" finally gain respectable scientific status? What is it now called? Why? What disease clearly demonstrates its importance? Are there more than six senses? Name an important group of additional senses.

7. What are the primary tastes? Are there corresponding sense organs? How can this be demonstrated? Why can we not speak of primary smells in the same way? Mention several ways in which primary tastes and salient smells are supplemented.

8. Explain why the Helmholtz theory of hearing is called the "piano theory," in terms of the construction of the basilar membrane. What is the main difference between this theory and the telephone theory? Which of these theories is given support by post-mortem examination of the partially deaf? Explain.

9. In what three ways may tones differ? Illustrate. What physical variables are the stimuli for each of these types of sensory experience? Illustrate.

10. Discuss the importance of overtones in music and in speech. In what respect do vowels and consonants differ most? What are the principal functions of the vocal cords, mouth, tongue, and lips in speech?

11. In what two ways is the person deaf in one ear handicapped? Under what conditions is it difficult to locate the source of sounds even with normal ears? How are auditory cues normally supplemented so as to minimize this difficulty?

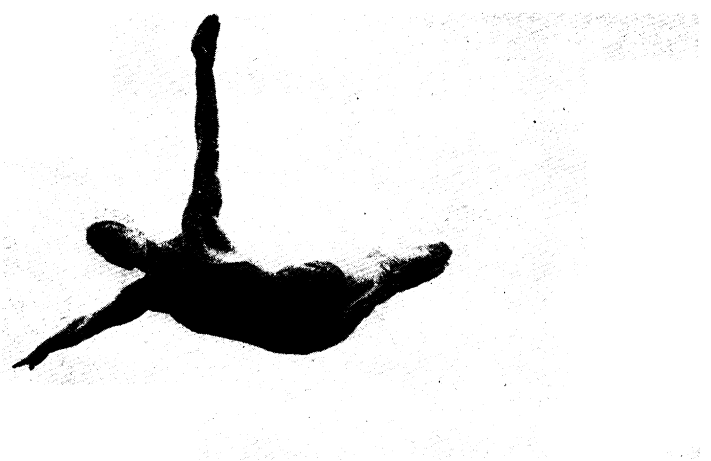


FIG. 43. Helen Crlenkovich as she won the national outdoor three-meter championship in 1939. She was also the indoor three-meter title holder in 1939 and again in 1940. (*Pictures, Inc.*)

12. Do we hear sounds or do we hear objects when listening to: (a) noises, (b) music, (c) a person talking (and saying something)? Discuss.

13. What is common to the functioning of bats, radar, and "facial vision"?

14. For what two main jobs other than hearing is the inner ear responsible? Illustrate the working of the "semicircular canals" by explaining the sequence of sensations experienced by a person in a rotating chair which starts from rest, attains a steady velocity, and then suddenly stops.

B. General Questions

1. A good radio receiving set is analogous to a good sense organ in several ways. Name three or four. Does this analogy hold in a rough sort of way for perception, as well as for the reception of stimuli? Explain.

2. It is possible to obtain a most vivid demonstration of the phenomenon of temperature adaptation by placing a frog in a pot of water and

gradually raising the temperature. If the frog can be kept amused long enough, it is possible to bring the water to a boil without his attempting to jump out; though this is probably not good for the frog and he would certainly make a vigorous protest if dumped suddenly into boiling water. What reasons are there for assuming that this would be impossible with a human subject? State one advantage and one disadvantage in temperature adaptation.

3. Consider for a moment Figure 43. What senses other than vision are involved in the execution of this perfect dive? In a highly coordinated action like this, or like ski jumping or pole vaulting, is the perception of meaning back of sensory signs involved? Explain.

4. Describe the predicament of a person with no kinesthetic sense in two of the following situations: (a) climbing a tree, (b) at bat, (c) serving in tennis, (d) running a race, (e) diving, (f) ski jumping or just doing a "Christie."

5. Of what biological value are the organic senses and the sense of pain? Have the sense of taste and the sense of smell a similar value? Explain.

6. The sense of hearing is remarkable in its analyzing power. Give one or two examples of this from your experience singing in a chorus, playing in an orchestra, or listening to music and picking out the various voices or instruments. Do you think a trained singer or instrumental virtuoso hears in a musical work the same thing that the musical dub hears? What principles of perception does this illustrate?

7. What correspond to the otoliths in the crayfish are formed anew after each shedding of the exoskeleton, by the cementing together of little grains of sand. A certain investigator, whose mischievousness was as great as his scientific curiosity, substituted iron filings for the sand in the aquarium just after a crayfish had molted. Can you tell what happened, and why, when a magnet was subsequently held over the unsuspecting creature's head? (Note: the magnetic attraction was not sufficient to lift the whole crustacean.)

8. Consider the Gluyas Williams cartoon "Buffet Supper," Figure 44. Have you ever been through this sort of ordeal? Do you think the pleasures of the palate alone are sufficient to account for the prevalence of this form of indoor sport? If not, what are the motivating factors? Is good taste involved in any way? Explain.

9. Do you think there would be general agreement with the opinion expressed by Thoreau at the beginning of this chapter, or is this a rather peculiar taste on his part? Explain.

C. Special Questions

1. Euclid insisted that "the whole is equal to the sum of its parts." A psychological whole seems to be something more than the sum of its parts. Give three examples of this from the field of sensation and perception.

2. Certain fish have taste buds distributed over the entire surface of the body. This might be very pleasant while swimming in a sea of lemonade, but there must be corresponding disadvantages. If human beings were so endowed, what perceptual confusions might result? How does this relate to the general principle of selectivity in perception?

3. What senses other than vision and hearing are vital to the airplane pilot? Explain.

BUFFET SUPPER
FIG. 44.

Permission Gluyas Williams and The New Yorker. *Copyright The F–R Publishing Corporation.*

4. What cues are used in tuning a violin or other orchestral stringed instrument? Explain. Does the piano tuner commonly make use of any other devices? Explain.

5. Show how the phenomenon of sympathetic vibration may enter in connection with three of the following: (a) the action of the basilar membrane; (b) two tuning forks; (c) foot soldiers crossing a bridge; (d) pushing over an old tree in the woods; (e) a telephone receiver.

6. Have you ever been in a cathedral when the lowest organ "tones" were used, those below the limit of audibility? How did you sense them? What is the advantage of having such "tones"?

7. Can you give any examples of insects responding to pitches above the human range? Do you know how these notes are produced? How they are received?

8. How is the major diatonic scale constructed? How are the melodic and harmonic minor diatonic scales constructed? Do you know the construction of any of the oriental scales? With such wide differences in scale structure in different parts of the world, can we say that there is any innate basis for the sense of melody and harmony?

9. Does the radio or telephone engineer have a greater problem in reproducing the vowels or the consonants? Explain.

10. Do you regard the quotation from Zeno at the beginning of this chapter as an expression of wisdom, or just a "gag"? Do you usually follow this advice?

SOUND LOCALIZATION

Purpose. To show the possibilities and limitations of sound localization.

Materials. Members of the class will be used as producers of the necessary auditory stimuli.

Procedure. One member of the class is selected as subject, *O*. He is blind-folded and placed at the center of a circle. Then eight people (all of the same sex) are seated around the circumference at intervals of 45 degrees. (See the record sheet, below.) The radius of the circle may be three or four feet. The positions around the circle are numbered from 1 to 8 as shown in the record sheet.

Two sounds are to be employed, one a humming "mm" with closed mouth (giving mostly low vibration rates) and the other a loudly whispered "sh" (giving mostly high vibration rates).

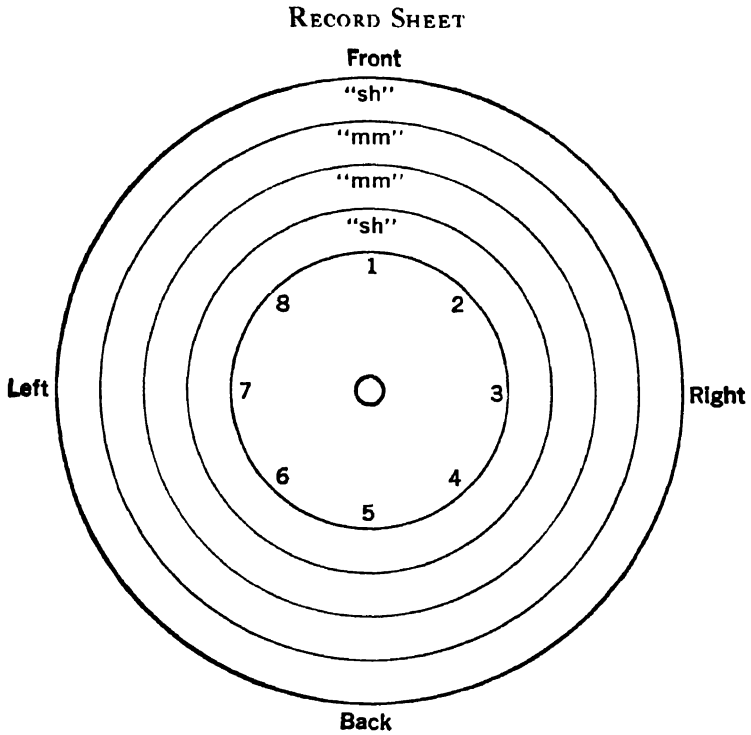
There are four rounds, the first and last using the "sh" sound, the second and third the "mm" sound. Between rounds the eight stimulus people change positions (so as to prevent *O* from utilizing their voice peculiarities).

In preparation for the first round *E* writes on the blackboard a random order of the numbers from 1 to 8, and the eight stimulus people sound "sh" in this order. After each person has given the "sh" sound for 1 to 2 seconds, *O* points toward the source of the sound, as well as he can; i.e., *O* points

toward one of the eight people seated around him. *E* records on the blackboard *O*'s response beside the stimulus number.

Each student records the response number in the inner ring of the record sheet and in line with the stimulus number. Thus, if *O* points to 2 when the stimulus came from 4, the record shows a "2" outside of 4. When *O* points toward the true source of sound, the stimulus and response numbers are of course the same.

When each of the stimulus people has made the "sh" sound in his turn, the first round is complete. In preparation for the second round the stimulus people change their positions around the circle, and *E* writes a new



random order of the numbers 1 to 8 on the blackboard. The humming sound "mm" is used as the stimulus in the second round. The record is made in the second circle of the record sheet.

For the third and fourth rounds another *O* and other stimulus people may be chosen, and the "mm" sound is used before the "sh" sound, so that any practice effect will be to the advantage of the "sh" sound instead of to the advantage of the "mm" sound as in the first two rounds.

A variation of the experiment is to have *O* close one ear by inserting a finger into the ear hole.

Results. The record sheet will show whether stimuli from all directions were judged with equal accuracy. The results with "sh" can be compared with those with "mm."

Discussion. The principal questions are whether right can be distinguished from left and whether front can be distinguished from back in locating sounds, and whether one kind of sound is better localized than another.

1. Was there any confusion between right and left?

(a) With the "sh" stimulus. How many right-left or left-right reversals, out of a possible 12?

(b) With the "mm" stimulus. How many right-left or left-right reversals, out of a possible 12?

2. Was there any confusion between front and back?

(a) With the "sh" stimulus. How many front-back or back-front reversals, out of a possible 12?

(b) With the "mm" stimulus. How many front-back or back-front reversals, out of a possible 12?

3. If *O* distinguishes sounds coming from right and left, there must be some difference in the stimulus received in the two cases. What can this difference be?

4. What difference can there be between sounds coming from front and behind?

5. What is the difference between the "sh" and "mm" stimuli, in terms of high or low vibration rates? Why should one be easier to detect than the other?

A Film on the Stimuli for Hearing [1]

This sound film was expertly produced with the collaboration of Drs. H. B. Lemon and H. I. Schlesinger of the University of Chicago, and

[1] *Sound Waves and Their Sources.* Sound. Encyclopaedia Britannica Films, Inc., 20 N. Wacker Drive, Chicago 6, Ill. Length, 10 min. Price, with educational discount, $45.00. Rental, $2.50 for the first day and $.50 per day thereafter.

Drs. Harvey Fletcher and Donald MacKenzie of the Bell Telephone Laboratories. Animated drawings and normal photography explain several types of sound sources, including the vocal cords, the vibrating string, and the organ pipe. Frequency, amplitude, wave length, fundamentals, and harmonics are demonstrated, and their relation to loudness, pitch, and tone quality are explained. The high-speed camera and the oscilloscope are used to clarify the phenomena presented. When you have seen the film fill in the parentheses below with a + for true and a − for false or partly false.

( ) 1. Sound originates in vibrating objects that set up waves in the surrounding media.

( ) 2. Each vibration of the tuning fork starts a new wave impulse which is carried away from the fork by air molecules.

( ) 3. The sound wave is made up of alternate regions of condensation and rarefaction.

( ) 4. The loudness of the sound depends primarily upon the frequency.

( ) 5. The pitch of the sound depends primarily upon the amplitude.

( ) 6. The frequency of the first harmonic is about one half that of the fundamental.

( ) 7. The quality of the tone depends on the number and relative strength of the harmonics.

( ) 8. There is a lack of regularity in the waves which produce noise as distinguished from the stimulus for a musical tone.

( ) 9. Diaphragms are seldom used as sources of sound waves.

( ) 10. The wave length of the tone from an organ pipe is approximately equal to the length of the pipe.

( ) 11. The vocal cords are surrounded by the glottis.

( ) 12. The size of the glottis is reduced by increasing the tension in the vocal cords.

( ) 13. The pitch of the voice tone is lowered by increasing the tension in the vocal cords.

(The scoring key is given in *Notes for Instructors.*)

Name_____ Section_____ Date_____

CHAPTER FIFTEEN

OBJECTIVE EXERCISES

A. True-false and Multiple-choice Questions

( ) 1. The kinesthetic senses come under the heading of: (1) interoceptors (2) exteroceptors (3) proprioceptors (4) distance receptors.

( ) 2. Which one of the following is *not* a factor upon which the efficiency of a sense organ depends: (1) its selectivity (2) its sensitivity (3) its responding differently to different stimulus intensities (4) its responding differently to different stimulus qualities (5) its distance reception?

( ) 3. Which one of the following is *not* a primary skin sensation: (1) warmth (2) cold (3) touch (4) moist (5) pain?

( ) 4. The "psychological zero" of the temperature sense remains fairly constant at a value just a few degrees below body temperature.

( ) 5. The touch receptors are always provided with delicate hairs as accessory apparatus.

( ) 6. "Muscle spindles" are among the sense organs which account for the "sixth sense."

( ) 7. Which of the following is *not* a primary taste sensation: (1) sweet (2) sour (3) bitter (4) salty (5) acid?

( ) 8. A sweetened bitter sensation tastes bitter when applied to the tip of the tongue and sweet when applied to the rear of the tongue.

( ) 9. The flavor of food consists largely of odor.

( ) 10. The sense of smell is often supplemented by cutaneous sensations from the interior of the nose.

( ) 11. The cochlea is surrounded by the basilar membrane, which is sensitive to a wide range of vibrations.

( ) 12. Post-mortem examination of the inner ear has given support to the Helmholtz "piano theory" of hearing.

( ) 13. The pitch of a tone is primarily dependent upon the vibration rate.

( ) 14. The loudness of a tone depends not only on the amplitude but the frequency of vibration.

( ) 15. The timbre of a tone depends upon the number and combination of the overtones.

( ) 16. The human ear is sensitive to vibrations ranging from about 50 to 50,000 per second.

( ) 17. The human ear is most sensitive in the middle part of the range, to vibration rates of from 500 to 5000 per second.

( ) 18. It is possible for a wide-awake person with normal ears to experience no sensation of rotation even though turning fairly rapidly.

( ) 19. The vocal cords produce the vowel sounds; the mouth, tongue, and lips produce the consonants.

( ) 20. Older people have more difficulty hearing consonants than vowels.

( ) 21. It is binaural hearing that enables us to distinguish between sounds in the front-back dimension.

( ) 22. The inner ear contains organs for the maintenance of posture and equilibrium.

B. Matching Exercises

Answers: (1) hearing (2) buds (3) cochlea (4) smell (5) inertia (6) sight (7) brain (8) time (9) otoliths (10) blends (11) space.

( ) 23. The sense of rotation depends on the .... of the liquid in the semicircular canals.

( ) 24. It is the ..... . in the vestibule which aid in giving the sense of head position.

( ) 25. The sense of ..... is the most important of all the senses.

( ) 26. According to the telephone theory, the process of analyzing certain component notes out of a combination takes place in the .....

( ) 27. The ..... contains the basilar membrane, upon which rest the sense cells for hearing.

( ) 28. Though it is possible to identify certain elementary sensations in touch, taste, and smell, most sensations in these categories are .....

( ) 29. Hearing is superior to vision as an analytic sense, but it is quite inferior as a ..... sense.

( ) 30. The actual organs of taste are known as the taste .....

CHAPTER SIXTEEN

Learning

Knowledge comes but wisdom lingers.
— Tennyson

A little knowledge is a dangerous thing;
Drink deep, or taste not the Pierian spring:
There shallow draughts intoxicate the brain,
And drinking largely sobers us again.
— Pope

Learning makes the wise wiser, and the fool more foolish. — John Ray

And still they gazed, and still the wonder grew,
That one small head could carry all it knew.
— Goldsmith

QUESTIONS FOR DISCUSSION

A. Text Questions

1. Define learning. What is the relation between learning and motivation, development, and observation?
2. How did Lloyd Morgan's fox terrier help him to develop his canon? How does Lloyd Morgan's canon apply to an interpretation of animal behavior generally?
3. Illustrate from the behavior of some animal the four essentials of trial-and-error learning. Illustrate negative adaptation.
4. Illustrate from the maze behavior of rats the fallacy of the chain-reflex and the fixed-path theories. What advantage does man have over the rat in maze learning?
5. Illustrate place learning in cats and tool learning in monkeys, chimpanzees, humans, and the like. Which is the more sophisticated?
6. Discuss the meaning of the term *insight* in the learning of chimpanzees and humans. What is its relation to foresight and hindsight?
7. What are the four principal differences between human and animal learning?
8. Illustrate and explain "physiological limit" and "plateau" in the learning of a complex skill such as typing. What are some of the methods of getting off a plateau?

9. Give examples of three different kinds of sequence learning. With which of these is the conditioned response most closely associated? Explain.

10. Illustrate from Pavlov's classical experiments the establishment and the extinction of a conditioned response.

11. Illustrate selective conditioning. What is meant by the terms *stimulus generalization*, and *differentiation?*

12. Give two illustrations of conditioned responses in human beings. Why is it more difficult to demonstrate this type of learning in human adults than in animals?

13. How does Skinner's "instrumental" conditioned response-box bridge the gap between Thorndike's trial-and-error puzzle box and Pavlov's conditioned-response experiments?

14. Describe briefly three or four important factors in learning.

15. Discuss the factor of reinforcement in learning. Give several examples. What is its relation to exercise and repetition, and to reward and punishment?

William James on the Importance of Interest

From *The Principles of Psychology*

Millions of items of the outward order are present to my senses which never properly enter into my experience. Why? Because they have *no interest* for me. *My experience is what I agree to attend to.* Only those items which I *notice* shape my mind — without selective interest, experience is an utter chaos. Interest alone gives accent and emphasis, light and shade, background and foreground — intelligible perspective in a word. It varies in every creature, but without it the consciousness of every creature would be a gray, chaotic indiscriminateness, impossible for us even to conceive. Such an empiricist writer as Mr. Herbert Spencer, for example, regards the creature as absolutely passive clay, upon which "experience" rains down. The clay will be impressed most deeply where the drops fall thickest, and so the final shape of the mind is molded. Given time enough, all sentient things ought, at this rate, to end by assuming an identical mental constitution; for "experience," the sole shaper, is a constant fact, and the order of its items must end by being exactly reflected by the passive order which we call the sentient organism. If such an account were true, a race of dogs bred for generations, say in the Vatican, with characters of visual shape, sculptured in marble, presented to their eyes, in every variety of form and combination, ought to discriminate, before long, the finest shades of these peculiar characters. In a word, they ought to become, if time were given, accomplished connoisseurs of sculpture. Anyone may judge of the probability of this consummation. Surely an eternity of experience of the statues would leave the dog as inartistic as he was at first, for the lack of an original interest to knit his discriminations on to. Meanwhile the odors at the bases of the pedestals would have organized themselves in the consciousness of this breed of dogs into a system of "correspondences" to which the most hereditary cast of custodians would never approximate, merely because, to them, as human beings, the dogs' interest in those smells would forever be an inscrutable mystery. The empiricist writers have, then, utterly ignored the fact that subjective interest may, by laying its weighty index finger on particular items of experience, so accent them as to give to the least frequent associations far more power to shape our thought than the most frequent ones possess. The interest itself *makes* experience more than it is made by it.

B. General Questions

1. Ambrose Bierce, in his *Devil's Dictionary*, defined erudition as "dust shaken from the pages of a book into an empty skull." While this contains a faint suggestion of cynicism, there is some truth in it. A similar idea was expressed less brutally by Tennyson, who said: "Knowledge comes but wisdom lingers." Perhaps they both had in mind Samuel Johnson's definition of a net as "a substance reticulated and recussated with interstices between the intersections."

Can you suggest any factors which should help to prevent the degeneration of learning into mere pedantry? What about insight, the interest factor, application to real-life situations, etc.?

2. Give two examples of trial-and-error learning from your own experience, choosing one in which motor activity was not prominent. Do you feel that observation in general, or even insight, played any part? Explain.

3. Can you think of anything roughly corresponding to "place learning," negative adaptation, and reinforcement in learning: (a) how to swim, (b) how to solve a geometry problem, (c) a foreign language? Discuss.

4. Give an example of the development of tool learning in a growing child. Give an example of the mastery of higher units in some learning process in your own experience.

5. Cats have been taught to run away from rats. Can you suggest how this could be done? (See Figure 32.) Suggest a conditioned-response explanation for at least two of the following: the emotions aroused by (a) some symbol, such as a cross, a badge, or a flag; (b) a primitive taboo; (c) a lock of hair; (d) a prejudice; (e) a body of water.

6. What common import do you find in the quotations from Tennyson, Pope, and John Ray at the beginning of this chapter? What difference in implication do you find?

7. Look carefully at Figure 45. Observe the complete absence of tension. This is remarkable considering the magnitude of the tasks undertaken at this conference and the obstacles still to be faced by the Big Four Foreign Ministers. Do you think this unusual capacity to maintain composure when weighty problems remain unsolved is in part the result of negative adaptation in a man accustomed to dealing with affairs of great moment? Or do you think that this capacity is in part, at least, the cause of Marshall's rise to positions of such responsibility? Discuss.

8. Is it possible to recall any genuine examples of insight from your own experience? Did you ever experience anything corresponding to Archimedes' cry of "Eureka" ("I have found it") referred to on page 17? Describe.

9. Read the passage from William James on the importance of interest. Give two examples from your own experience of the inefficiency of mere repetition in learning. Give an example of learning very rapidly under the spur of keen interest.

10. Give two examples, not mentioned in the text, of the learning of complex skills from which a fairly smooth learning curve, with an occasional plateau, might be expected. Can you tell how you got beyond a plateau in any learning task?

FIG. 45. Secretary of State Marshall relaxes at Moscow. (*Press Association photo.*)

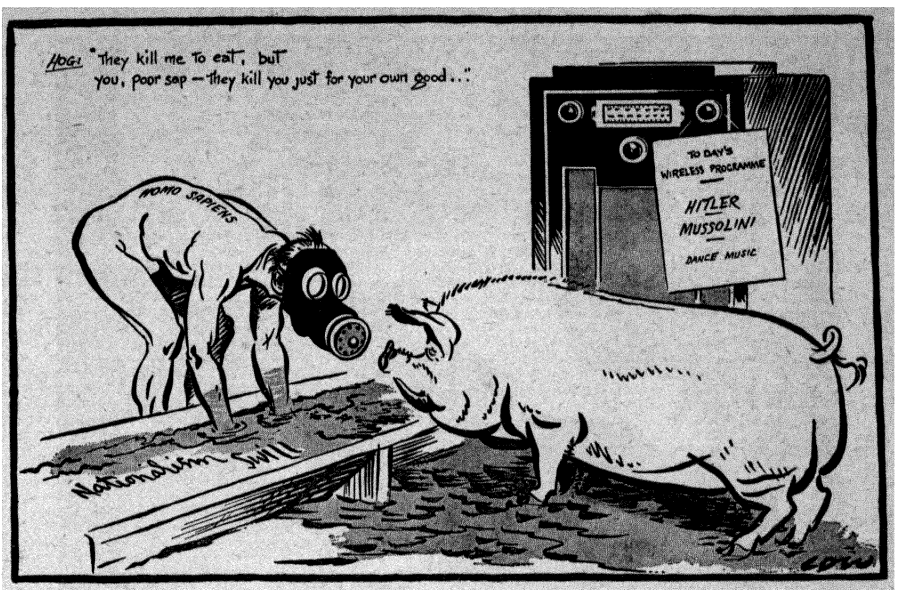
C. Special Questions

1. Contemplate the David Low cartoon in Figure 46 and put your tail between your legs! The noted anthropologist E. A. Hooton expresses an equally flattering opinion of man when he refers to him, not as *homo sapiens* but as "*homo flatulens.*" Though individual human beings — some of them — have made brilliant progress in solving life's problems, collectively man does indeed seem dumber than the dumb animals in his group relations. Why should this be so? Haven't we learned enough? Have we learned the wrong things? Has our natural science got ahead of our human science? Have we misapplied what we have learned? Discuss.

2. Of what more general scientific principle is Lloyd Morgan's canon a corollary? Give an illustration of this more general principle. Could the canon be applied to the interpretation of the behavior of young children? Illustrate.

3. Louis XV had such a morbid horror of death that he forbade any mention of the subject in his presence. A court secretary who accidentally let slip the phrase "the *late* king of Spain" so infuriated him that he only

escaped with his life by adroitly following up the remark with: "It is a title they take, your Majesty." Is there any connection between this attitude of Louis's and conditioned-response learning? Explain. What about the meaning of words in general?



"Progress of Man"

Fig. 46. This cartoon by David Low speaks for itself and, unfortunately, for our times. (*From* A Cartoon History of Our Times, *by David Low. Reproduced by permission of Simon and Schuster, publishers.*)

4. Mozart at the age of four wrote an intelligible harpsichord concerto. Mention any other examples you know of phenomenal learning ability exhibited by any other great figure in any field. Do you consider that this was due to superior intelligence, superior training, special natural talents, unusual drive, or some combination of these?

5. Do you know the exact sources of the quotations from Tennyson and Goldsmith at the beginning of this chapter? Do you know of examples of the truth of the Tennyson quotation?

FACTORS IN LEARNING — THE LEARNING CURVE

Purpose. To bring out certain characteristics of human learning, such as reinforcement and the use of higher units; and to obtain a learning curve.

Materials. Work Sheet and blank plotting chart (see below) for each member of the class. Watch, preferably a stop watch, for the experimenter.

Procedure. *E* explains what is to be done with the Work Sheet and then says, "Go." At the end of each successive minute, *E* says, "Mark" and

each *O* indicates by a mark on his Work Sheet the point reached at that moment. *O* continues his work without pause till he has finished the Work Sheet or till *E* says, "Stop."

O next thinks back over the work and answers the following questions:

1. Were you aware of increasing speed and facility?

2. Did you become so well acquainted with certain *single-letter* substitutions as to make them automatically? Examples.

3. Did you become so well acquainted with certain letter or word *combinations* as to decode them automatically? Examples.

4. Did you notice any other short cuts or ways of saving time?

5. Was there any evidence of reinforcement for reasons other than repetition?

6. Did the speed of work vary, and if so was there any obvious reason for the variation?

Pof eba, uif poma eba jo uijt tupsa,

Pof tipsu eba, pof dpme eba jo xjoufs,

Pof Npoeba, b tipsu ujnf gspn Disjtunbt,

Poma tjy ebat bmpoh jo uif ofx afbs,

Xibu xfou po jo Ejoh Epoh, rvbjou wjmmbhf,

Jo Ejoh Epoh, uibu tipsu xjoufs eba?

Xfmm, jo Ejoh Epoh uxp nbjefot xfsf mjwjoh,

Ca obnf Beb boe Jeb, opu tjtufst,

Beb Xjoh, Jeb Ijoh, po uif sfdpset,

Cvu gps tipsu, pof xbt Beb, pof Jeb.

Gbjs xbt Beb, jo Ejoh Epoh uif gbjsftu.

Ebsl xbt Jeb, tipsu, tqbslmjoh boe hba.

Boe jo Ejoh Epoh uxp qmba cpat xfsf mjwjoh,

Pof xbt Ofe, pof xbt Ufe, xvjuf hppe-mppljoh,

Ofe Nba boe Ufe Nba, poma dpvtjot.

Eba ca eba Ofe boe Ufe xpslfe po Nbjo Tusffu,

Boe bt Ejoh Epoh xbt poma b wjmmbhf,

Eba ca eba uifa uppl ujnf pvu up qmba.

Jo Ejoh Epoh uibu eba topx xbt gbmmjoh,

Ca oppo topx xbt effq bmpoh Nbjo Tusffu.

Ofe uppl Beb pvu gps b tmfjhi sjef,

Ufe boe Jeb xfou upp po uif cbdl tfbu.

Bmm Ejoh Epoh xbt sjohjoh xjui tmfjhi cfmmt,

Boe uif topx, ju xbt dpnjoh up tuba.

Uifo tbje Beb up Ofe, Ufe boe Jeb,

"Upeba nba opu mppl nvdi mjlf Nba Eba,

Cvu jo Ejoh Epoh ju qbat up tubsu fbsma.

Poma tjy tipsu npouit up uif txjn nffu.

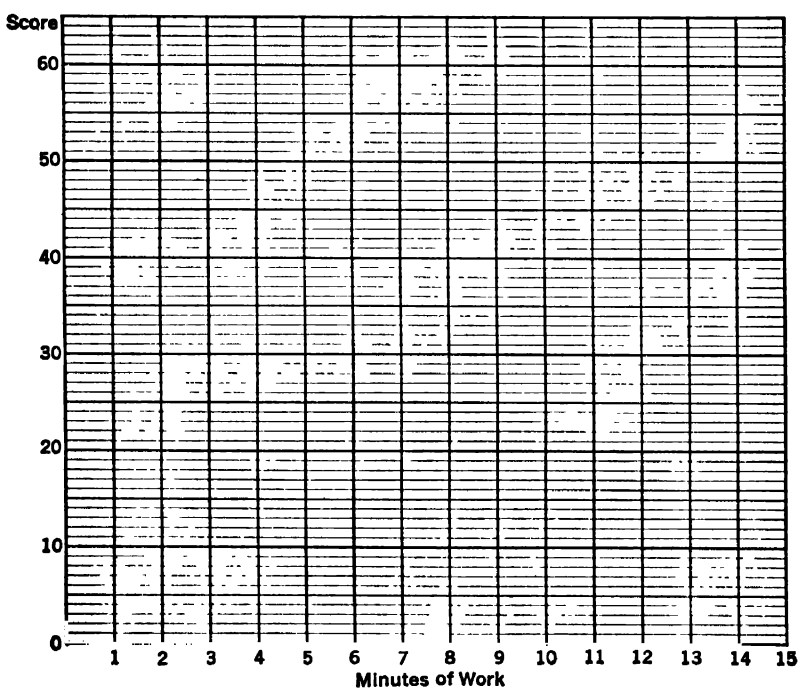
Mfu't nblf Jeb rvffo pg uif txjn nffu,

Boe nblf nf uif rvffo pg uif Nba."

Results. Each *O* scores his own paper by counting the letters done in each minute. He then plots his own learning curve by indicating his score for each successive minute, according to the scale on the chart.

If time permits, the average (or median) score of the class for each minute may be computed and the learning curve for the class as a whole may be plotted on each *O*'s chart. (Use different marks for the individual and the group scores.)

LEARNING CURVES



Discussion. After comparing results from different *O*'s, state your conclusions on the following points.

1. As to causes of improvement, did the reports of different *O*'s agree in general? In detail?

2. What were the main observable causes of improvement?

3. Did the learning curve reach or come near to the physiological limit for this very specialized task?

4. Was there any clear sign of a plateau?

5. In what ways does the individual curve give a truer picture of the progress of learning, and in what ways is the group curve superior?

OTHER IMPORTANT FACTORS IN LEARNING

Purpose. To demonstrate the importance of certain common factors in learning.

Materials. Stop watch or other watch with second hand. Pencils and paper. Test materials printed elsewhere in this manual (see *Notes for Instructors*).

Procedure. *E* will designate the material to be memorized just before giving the starting signal. Learn as many items as you can in the 30 seconds allowed. The order of recall is not important. Read through all the material several times; do not make any special effort to learn any particular part of the material. When time is called you will have two minutes to write down your recalls.

Results. When the two-minute recall period is over, check your results. By a show of hands find out what words were most easily learned. Study the original material to see if you can find any reasons for these results.

Discussion. Is there any evidence that recency, frequency, vividness, or meaning facilitated recall? Discuss.

A Film on the Learning of a Secondary Habit in Cats [1]

Prof. K. U. Smith of the University of Rochester has produced an intriguing and instructive film which is intended primarily to demonstrate the learning of a secondary habit in cats. The cats learn to push a ball into a funnel in order to make their food available. Later they learn to pull a string in order to produce balls for this purpose. The balls thus become token-rewards. Trial-and-error learning is involved in the process, and possibly partial "insight." The process may also be regarded as an example of "instrumental" conditioned response learning. After you have seen the film, fill in the parentheses below with a + for true and a − for false or partly false.

( ) 1. When the ball is put into the chute it rings a bell which is a signal for *E* to toss the cat some food.

( ) 2. The cat is first trained to use the balls with the string removed from the box.

( ) 3. Early in the learning process the cats seem to connect the dropping of the ball into the chute with the availability of food.

( ) 4. When the string is first introduced success occurs by accident.

( ) 5. The first cat does not press the string with its paw until the eighth trial.

( ) 6. As learning progresses, the cat's behavior becomes less random and more clearly goal directed; i.e., toward the string, the ball, and the food.

( ) 7. The second cat learns to press the string more quickly than the first.

[1] *The Acquisition of the Token-Reward Habit in the Cat.* Silent. Psychological Cinema Register, Pennsylvania State College, State College, Pa. Length, 389 ft. Price, $24.50. Rental, $1.25 per day.

( ) 8. Subject number 4 presses the string on the first trial but later ignores it for several trials.

( ) 9. The behavior of the "experts" involves a minimum of waste motion.

(Scoring key is given in *Notes for Instructors.*)

A Film Showing the Use of Tools in Problem Solving by the Chimpanzee [2]

Dr. T. A. Jackson, while at the Laboratories of Primate Biology of Yale University, produced an excellent film showing the use of fairly elaborate tools by chimpanzees in the solution of problems. In addition to demonstrating a mental prowess on the part of a collateral branch of the human family which is intrinsically interesting, the film disproves an early Gestalt assumption: it is *not* necessary that the chimpanzee should have the incentive and the tool in the visual field simultaneously if he is to succeed. When you have finished looking at the film fill in the parentheses below in the usual manner.

( ) 1. The chimpanzee could not make use of more than three intermediate tools in attaining the food.

( ) 2. At no time did the chimpanzee have to do more than turn his head away from the tool in order to see the food.

( ) 3. Some of the tools assembled by the chimpanzee had three parts.

( ) 4. In the detour maze the chimpanzee sometimes had to walk directly away from the food.

( ) 5. In the earliest trials depicted in the film the chimpanzee showed a great deal of random, aimless behavior.

( ) 6. The chimpanzee was apparently very confused by the multiple-stick problem.

(Scoring key is given in *Notes for Instructors.*)

A Film Showing Maze Learning in the Rat and Other Types of Learning [3]

This film, produced by Drs. C. J. Warden and G. M. Gilbert at Columbia University, has already been described in part in Chapter 10. Several other parts of the film are good illustrations of various learning phenomena and techniques for measuring learning. In particular, the white rat is shown learning on both an elevated and a standard enclosed maze; and a

[2] *The Use of Tools by the Chimpanzee in Problem Solution.* Silent. Films, Inc., 330 W. 42 St., New York City. (Also Atlanta, Chicago, Dallas, Los Angeles, and Portland, Oregon.) Length, approx. 400 ft. Price, $27.50. Rental, $2.50 per day.

[3] *Testing Animal Intelligence.* Silent. International Film Bureau, 84 E. Randolph St., Chicago 1, Ill. Length, 460 ft. Price, $28.00.

monkey is shown taking a test of visual discrimination and using tools on single and multiple platforms. The film also shows "neurotic" behavior in the monkey when the problem becomes too difficult for solution. When you have seen the film discuss the following questions.

1. What characteristics of trial-and-error learning are brought out in the film?
2. As the maze learning progresses, how does the rat's behavior change?
3. What is the evidence that the monkey really makes visual discriminations and is not merely being guided by some other cues?
4. What makes the multiple-platform test more difficult than the single-platform test? Is there any evidence in these tool-using tests, of any type of learning other than trial and error learning?
5. Is there any parallel between the situation that makes the monkey act "neurotic" and those situations that make human beings act neurotic?

Name_____ Section_____ Date_____

CHAPTER SIXTEEN
OBJECTIVE EXERCISES

A. True-false and Multiple-choice Questions

( ) 1. Learning consists in doing something new, provided the new activity is retained and reappears in later activities.

( ) 2. Lloyd Morgan's canon helps us to guard against: (1) introversion (2) excessive use of trial-and-error learning (3) surprise attacks (4) anthropomorphism (5) infra-learning.

( ) 3. Which one of the following is *not* essential to trial-and-error learning: (1) a set to reach a goal (2) exploratory activity (3) insight (4) trying a variety of leads (5) reaching the goal?

( ) 4. Which one of the following is the simplest type of learning: (1) insight (2) negative adaptation (3) tool learning (4) place learning (5) motor responses to sensory stimuli?

( ) 5. Negative adaptation may involve both emotional and motor responses.

( ) 6. The fixed path theory has supplanted the chain reflex theory as the currently acceptable explanation of maze learning by rats.

( ) 7. The order of learning exhibited by the rat in the maze is typically: the path, the place, the closely integrated sequence of movements.

( ) 8. It is probable that both rats and humans make use of landmarks, or intermediate goals, in maze learning.

( ) 9. Exploration is to place learning as manipulation is to tool learning.

( ) 10. In tool learning the cat learns a useful movement or series of movements.

( ) 11. At the "moment of insight" in the jointed-stick problem the chimpanzee passed from a state of helplessness to one of mastery.

( ) 12. Insight is sometimes foresight and sometimes hindsight.

( ) 13. Human learning is based on observation; trial-and-error learning is confined to the lower animals.

( ) 14. Locations are among the easiest facts to observe for both men and animals.

( ) 15. All human learning, including the learning of skills, is accomplished by observation.

( ) 16. Which one of the following is *not* an important factor in the superiority of human learning to animal learning? Man (1) is

a better observer (2) uses more deliberation (3) uses insight rather than trial and error (4) makes use of language (5) uses highly developed thinking.

( ) 17. Getting off a plateau in a learning curve is *least* satisfactorily explained in terms of: (1) better motivation (2) working with higher units (3) physiological limit.

( ) 18. The typical conditioned response is an involuntary preparatory response.

( ) 19. The conditioned responses produced in Pavlov's dogs were glandular rather than motor.

( ) 20. There is a fundamental similarity between negative adaptation and the extinction of a conditioned response.

( ) 21. Differentiation in conditioned-response learning is the overcoming of the initial stimulus generalization by selective reinforcement.

( ) 22. The salivary conditioned-response learning in adult humans is not as dependable as in dogs and young children.

B. Matching Exercises

Answers: (1) an instrumental CR (2) UR (3) establishment (4) US (5) reinforcement (6) temporal contiguity (7) CR (8) a selective factor (9) CS (10) reward and punishment (11) a sequence.

( ) 23. In the hand withdrawal from shock CR experiment the shock is the .....

( ) 24. In the eyelid-reflex conditioning experiment the flash of light is the .....

( ) 25. In Pavlov's classical experiment with dogs the flow of saliva with food in the mouth is the .....

( ) 26. Extinction of the CR usually takes place as the result of repetition without .....

( ) 27. A CR can be called ..... if it acts on the environment in such a way as to secure reinforcement.

( ) 28. Thorndike's trial-and-error puzzle box, Skinner's instrumental CR box, and Pavlov's classical CR experiments all involve the learning of ..... (Do *not* answer CR.)

( ) 29. Exercise alone may tend to strengthen all responses, but reinforcement is .....

( ) 30. Some psychologists prefer to speak of ..... rather than reinforcement.

CHAPTER SEVENTEEN

Memory

A man's real possession is his memory. In nothing else is he rich, in nothing else is he poor. — Alexander Smith

Pluck from the memory a rooted sorrow,
Raze out the written troubles of the brain,
. . . with some sweet oblivious antidote.
— *Macbeth*

QUESTIONS FOR DISCUSSION

A. General Questions

1. What are the three main aspects of memory? What are the two main subdivisions of one of these? Though this is not specifically mentioned in the text, can you tell which two of these four aspects are most definitely involved in the immediate memory-span test? Explain.

2. Discuss the general plan of the typical memory experiment as symbolized by the letters *L—I—R.*

3. What is involved in intelligent memorizing in addition to mere repetition? How does the process conform to the formula suggested for maze learning — "fitting parts into a framework"? How can the "paired associates" memory test be used to illustrate the importance of the "will to learn"?

4. Why is learning something like the Morse code more difficult than learning something like pairs of words? What devices have been found helpful in the learning of telegraphic code? Illustrate the part played by meaning in efficient memorizing.

5. Describe an experiment which illustrates the importance of recitation in memorizing. Suggest three reasons for the results, including an appropriate comment on reinforcement.

6. Discuss the relative merits of spaced and massed repetitions and of the whole and part methods of learning, with special reference to meaning, freshness of attack, warming up, and fitting parts into a framework.

7. Is retention in general best explained in terms of "unconscious activity" or "unconscious inactivity"? Which of these terms means approxi-

mately the same thing as a memory trace? From what three kinds of evidence can the existence of memory traces be inferred?

8. Explain and illustrate the following statement on forgetting: "Metabolic decline works against interference in the learning of the new, though it works with interference in impairing the retention of the old." Use the rate of forgetting during sleep as part of your illustration.

9. Illustrate both direct and indirect interference from paired-associates experiments. What is the effect of set on interference? Illustrate.

10. What is the relation between "recency effects" in learning and: (a) the "warming up" of a pitcher before going into the box; (b) the rapid initial drop in the curve of retention when there has been little "overlearning"; and (c) the establishment of memory traces? In answering part (c) discuss the effect of shock on the establishment of traces.

11. Distinguish between ordinary memory images, eidetic images, and hallucinations.

12. When memory is incomplete, as it usually is, we commonly construct, rather than "reconstruct"; produce, rather than "reproduce." Illustrate this statement by an experiment on memory for nonsense figures and by courtroom testimony.

13. Illustrate two kinds of interference with recall which may take place even when retention is good.

14. How may recognition be thought of in terms of Pavlov's "stimulus generalization"? What is the most probable explanation of false recognition? Illustrate.

15. Along what lines might an honest "memory training" course proceed? What part would "transfer of training" play in such a course? What about mnemonic devices?

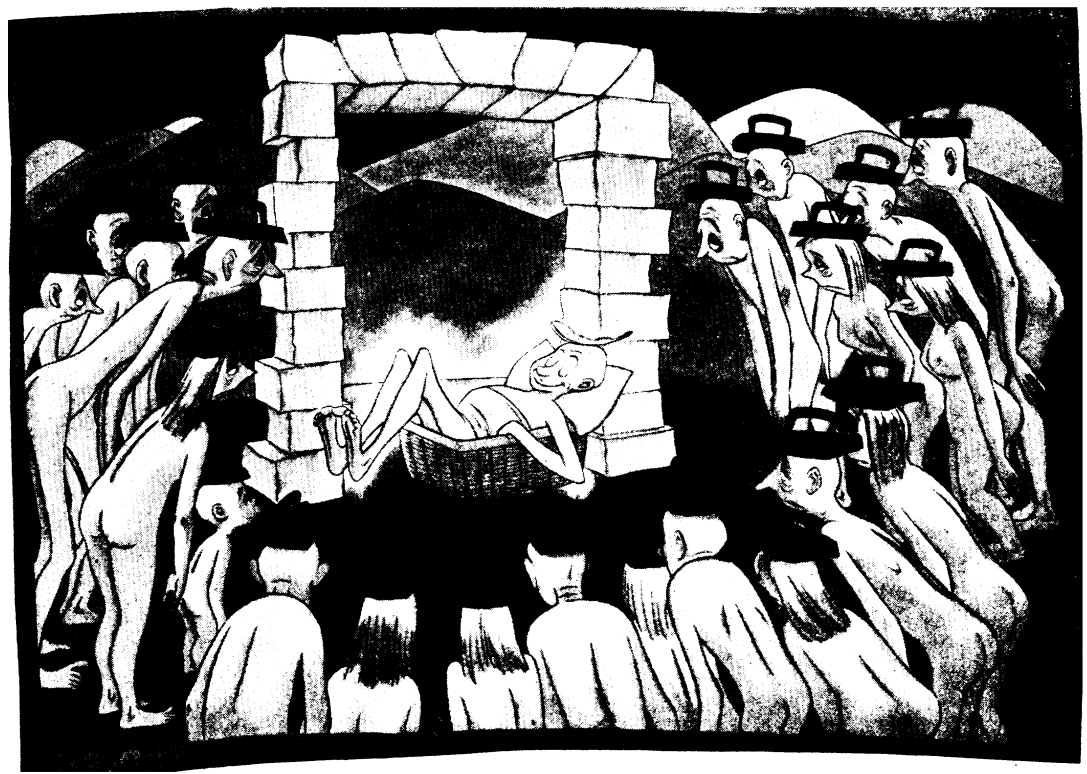
B. General Questions

1. Does the experiment on the importance of recitation corroborate your own impression of the relative merits of the lecture and recitation systems of teaching? Discuss. Do you find classroom discussions helpful? Discuss.

2. Give an example from your own experience of too much spacing in memorizing; give another of too little spacing. Are you usually in a position to space your learning just before examinations? In this the result of spacing earlier in the term?

3. Have you found that reward and punishment affect the efficiency of your memorizing? Illustrate. What kinds of rewards appeal to you most? What kinds of punishment should be discouraged in your opinion?

4. Can you see any connection between the implications of the quotation from *Macbeth* at the beginning of this chapter and the Abner Dean cartoon "Amnesia Victim" (Fig. 47)? Explain.



From It's a Long Way to Heaven, *copyright 1945 by Abner Dean, and reproduced by permission of Rinehart & Co., publishers.*

FIG. 47.

5. J. F. Dashiell in his *Fundamentals of General Psychology* quotes the following neat illustration of the interference caused by competing stimuli or impulses:

The centipede was happy quite
Until the toad in fun
Said, "Pray, which leg comes after which?"
This raised her doubts to such a pitch,
She fell distracted in a ditch,
Unable now to run.

Can you recall any experience of your own which was analogous to the plight of the centipede? How did you get out of the ditch?

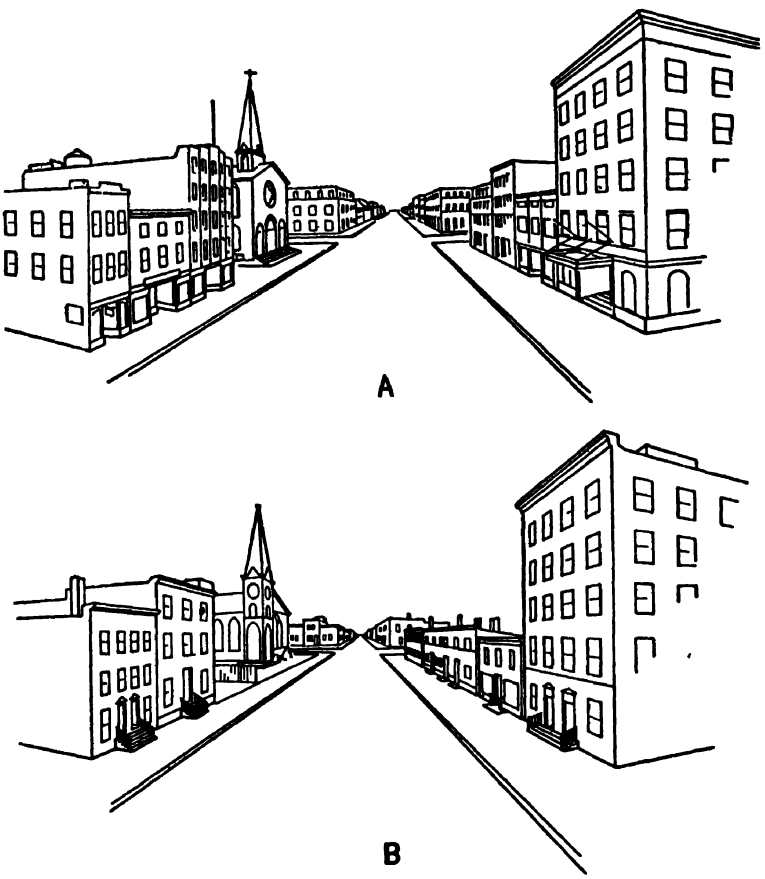


FIG. 48. A possible explanation of "paramnesia." Similar street scenes from two different cities, which might well account for the "illusion of having been there before." (*Reproduced from Dashiell, J. F.*, Fundamentals of General Psychology, *by permission of Houghton Mifflin Company.*)

6. Have you ever tried to forget by the method of repression? Were you wholly or partially successful? What other methods have you tried? Which do you favor? Explain.

7. Refer to Figure 48. Can you see in these two scenes a possible expla-

nation of the "illusion of having been there before?" Explain. Can you give other examples of false recognition based on a similar principle?

8. Did you ever experience eidetic images, or hallucinations? Illustrate each, from your own experience if possible, and try to explain.

9. Refer to Figure 49. Can you recall any example of creative recall from your own experience? Illustrate. Was marked distortion involved? What were the motivating circumstances? Do you think this sort of thing is more common in children than in adults? Discuss.

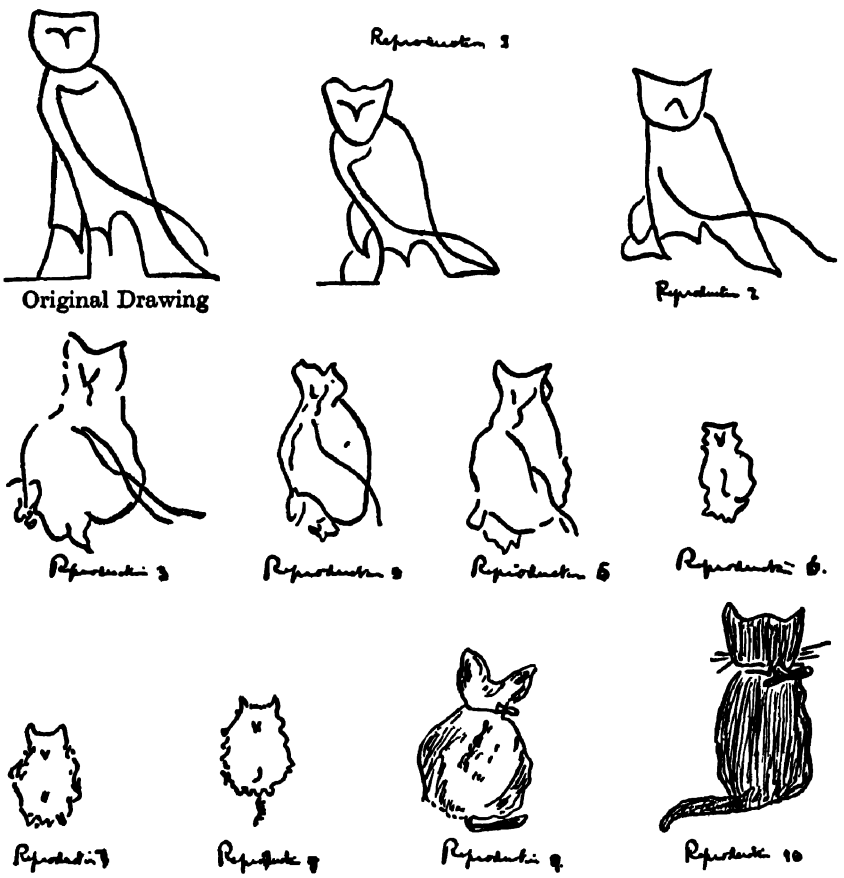


FIG. 49. An illustration of the creative nature of recall and reproduction. The original drawing is a representation of the Egyptian "mulak," a conventionalized owl. Each drawing was done by a different person from memory after having had ample time to study the preceding drawing. It has taken only nine or ten jumps to get from a mulak to a cat. This helps to explain the elaboration and distortion so common in gossip. (*Reproduced from* Remembering *by F. C. Bartlett. Cambridge University Press and The Macmillan Company, publishers.*)

C. Special Questions

1. You may recall Mark Twain's delightful yarn based on a pesky little jingle with a pronounced rhythm which wound up:

Punch, brothers, punch with care,
Punch in the presence of the passenjare.

5. J. F. Dashiell in his *Fundamentals of General Psychology* quotes the following neat illustration of the interference caused by competing stimuli or impulses:

The centipede was happy quite
Until the toad in fun
Said, "Pray, which leg comes after which?"
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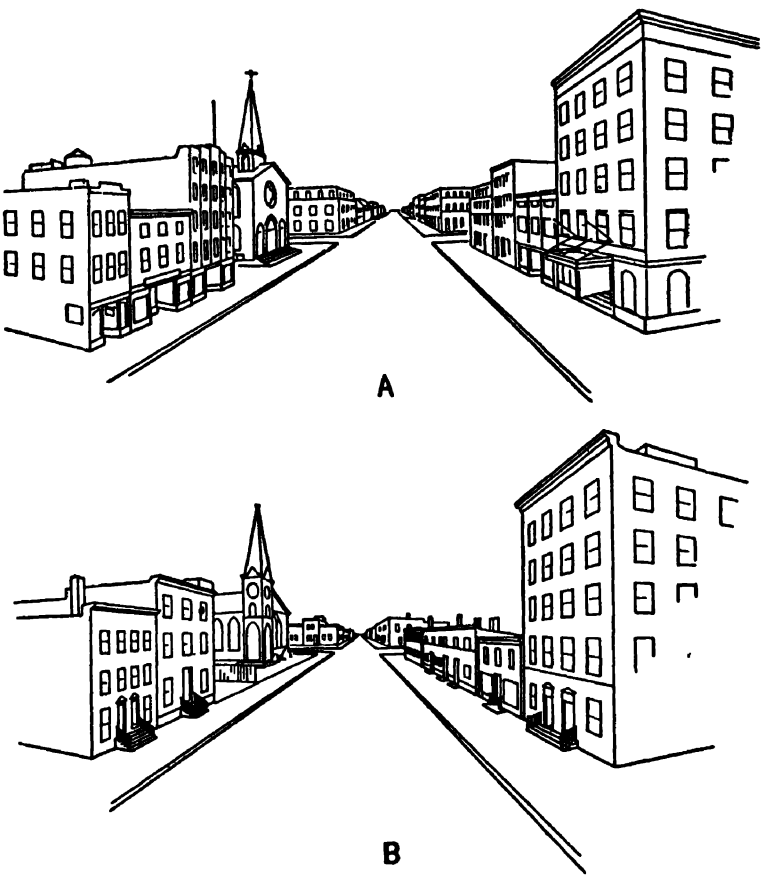

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8. Did you ever experience eidetic images, or hallucinations? Illustrate each, from your own experience if possible, and try to explain.

9. Refer to Figure 49. Can you recall any example of creative recall from your own experience? Illustrate. Was marked distortion involved? What were the motivating circumstances? Do you think this sort of thing is more common in children than in adults? Discuss.

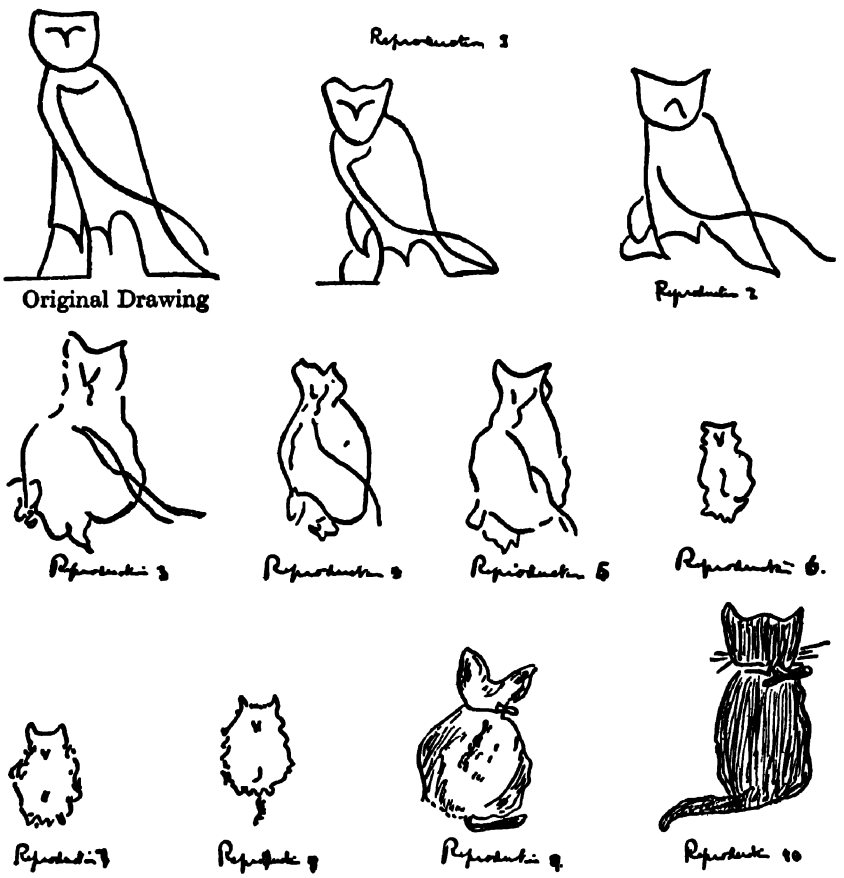

FIG. 49. An illustration of the creative nature of recall and reproduction. The original drawing is a representation of the Egyptian "mulak," a conventionalized owl. Each drawing was done by a different person from memory after having had ample time to study the preceding drawing. It has taken only nine or ten jumps to get from a mulak to a cat. This helps to explain the elaboration and distortion so common in gossip. (*Reproduced from* Remembering *by F. C. Bartlett. Cambridge University Press and The Macmillan Company, publishers.*)

C. Special Questions

1. You may recall Mark Twain's delightful yarn based on a pesky little jingle with a pronounced rhythm which wound up:

Punch, brothers, punch with care,
Punch in the presence of the passenjare.

You remember this thing began to "perseverate" ("recency effects" interfering with new material) and went round and round in his head until it nearly drove him mad. How did he free himself from this curse? Have you ever had a similar (but less exaggerated) experience? Under what circumstances did it occur? Was it connected with fatigue or other stress? How did you get rid of it?

2. Macaulay's memory was so remarkable that there is probably much truth in the statement that "if by some miracle of vandalism all copies of *Paradise Lost* and the *Pilgrim's Progress* were destroyed off the face of the earth, he would undertake to reproduce them both from recollection." Do you know of any other phenomenal memories? Who, for example, was the musician that succeeded in circumventing the Vatican law which forbade the removal of any music from the precincts by reproducing a mass from memory after only one hearing? How do you explain these feats: innate genius, special training, unusual interest, or what?

3. A certain heartless psychologist systematically exposed his helpless 15-month-old son to 20 lines of a play by Sophocles in the original Greek, every day for three months. Then a new set of 20 lines from the same play was inflicted on the child for the next three months; and so on, until the lad was three years old. In spite of this the child successfully attained the age of 8½ years. His cooperation was then enlisted, and he was asked to memorize a number of passages from the same work. Some of these were the ones used in his infancy, some were new; but he did not know which were which. This procedure demonstrated the existence of memory traces laid down over 7 years before when the unfortunate child was less than 18 months old.

From your own observation of children's ability to pick up words meaningless to them does this result strike you as incredible? Does this experiment give support to any of the views of Freud and Adler regarding the influence of the early years on the personality? Explain.

4. It has often been claimed that recall is more effective in the drowsy, relaxed hypnotic state than in the normal waking state. In a well-controlled experiment which used nonsense material for recall this claim was not borne out. However, in another equally well-controlled experiment, in which poetry learned some years before was the test material, recall in the hypnotic state was superior for all the subjects tested. The first experiment casts doubt on the hypothesis that the superiority of hypnotic recall is due to a general lowering of the threshold of recall. Both experiments are consistent with the hypothesis that the improvement under hypnosis is due to the removal of some sort of emotional blocking, or interference; for the poetry learned during the early school years may well have had emotional associations which we should not expect to find in the newly-learned nonsense material.

Is there a parallel between any of the suggestions for the management of recall given in the text and this second hypothesis? Explain. Under what

conditions have you ever experienced improved recall? Were they in any respect similar to those in the hypnotic state? Explain.

5. De Quincey in his *Confessions of An English Opium-Eater* rhapsodizes as follows: "O just, subtle, and all-conquering opium! that to the hearts of rich and poor alike, for the wounds that will never heal, and for the pangs of grief that 'tempt the spirit to rebel,' brings an assuaging balm; — eloquent opium that with thy potent rhetoric stealest away the purposes of wrath, — and through one night's heavenly sleep callest back to the guilty man the visions of his infancy, and hands washed pure from blood; — O just and righteous opium! —" Was De Quincey permanently successful in forgetting with the aid of opium? What substitute would you have suggested? Do you know of other similar cases? Illustrate.

6. Can you give the setting for the quotation from *Macbeth* at the beginning of this chapter? Did the doctor suggest a procedure like De Quincey's above, or something else?

PAIRED ASSOCIATES USED IN DEMONSTRATION INVOLVING RECENCY, FREQUENCY, VIVIDNESS, AND SET

Purpose. To illustrate the use of the paired-associates memory test in a demonstration involving recency, frequency, vividness, and set.

Materials. Pencils. A list of ten paired associates given in *Notes for Instructors*.

Procedure. The *O*'s will have pencils ready to write down their recalls in the blanks below when *E* so directs, *not before*. In this paired-associates memory test ten pairs of monosyllables will be read off by *E* at the rate of about one word a second. The *O*'s are to listen attentively so that when the presentation is over they will be able to write down the second word in each pair when *E* reads off the first word.

	A	B
1.	_____	_____
2.	_____	_____
3.	_____	_____
4.	_____	_____
5.	_____	_____
6.	_____	_____
7.	_____	_____
8.	_____	_____
9.	_____	_____
10.	_____	_____

Results. By a show of hands *E* will determine the number of *O*'s getting just 3 right, 4 right, 5 right, etc.

Discussion. 1. Which of the following factors were controlled: recency, frequency, vividness, set?

2. Which was the experimental variable? Is there any evidence that it was effective? Discuss.

3. Give an everyday example of the importance of this experimental variable.

4. Can we say that any one of the four factors in this experiment is always more important than any other? Discuss.

THE IMPORTANCE OF THE METHOD OF APPROACH IN MEMORIZING

Purpose. To compare two methods of studying a connected passage or of listening to a lecture. When the student is reading an assignment or listening to a lecture with a true-false or other form of detailed examination in prospect, he is naturally on the watch for specific points that may be called for in the examination. If on the contrary he expects to report the gist of the lecture or chapter, his approach is different. The question is whether it makes much difference which approach the student adopts.

Materials. Two passages to be read by *E* to the class. Examinations to be given on the two passages, the answers to be recorded on the blank form below.

Selection A	Selection B
1.	1.
2.	2.
3.	3.

Selection A	Selection B
4.	4.
5.	5.
6.	6.
7.	7.
8.	8.
9.	9.
10.	10.
11.	11.
12.	12.
13.	13.
14.	14.
15.	15.
16.	16.
17.	17.
18.	18.
19.	19.
20.	20.

Gist of Selection A:

Gist of Selection B:

Procedure. *E* divides the class into two approximately equal groups, Group I and Group II.

Group I is to take a true-false examination on Selection A, and to report the gist of Selection B.

Group II is to report the gist of Selection A, and to take a true-false examination on Selection B.

When this arrangement is clearly understood, *E* reads Selection A and then, after a short pause and reassignment of duties, *E* reads Selection B.

After both passages have been read once, *E* conducts the examination, and the papers are then scored. *E* assembles the scores on the blackboard for discussion.

Results. Averages to be transcribed from the blackboard.

Discussion. The form of the experiment, as well as the results, deserves some consideration. The first questions are on the results.

1. Were you aware of any distinct difference in attitude according as you expected one or the other type of examination?

2. Did the difference in attitude make any appreciable difference in the memory tests, in your own case?

3. Did the difference in attitude make any appreciable difference in the results for the class as a whole?

4. Can you draw any practical conclusions from the experiment?

5. As to the form or design of the experiment:
   (a) What was the object of dividing the class?

(b) What was the object of using two passages?

(c) Does the design of the experiment enable us to compare the effects of the two attitudes with all the following factors held constant or equated: difficulty of passage, individual differences in learning ability, practice effect?

DIGIT SPAN USED TO DEMONSTRATE RETROACTIVE INTERFERENCE

Purpose. To give a quick demonstration of retroactive interference by means of the digit span test.

Materials. Pencils. Watch with second hand.

Procedure. 1. *E* will read off nine mixed-up digits at the rate of about one per second. Then he will pause for 11 seconds. After that he will say "Write" and allow about 20 seconds for the *O*'s to write down as many as they can recall in the blanks below. They must be in the *right order.* (It is presumed that the digits themselves are already familiar.)

2. *E* will then read off the nine digits in a different order. But now, instead of pausing, he will read them off in a third order after a pause of two seconds. The *O*'s are to concentrate on the first set in this part of the procedure and try to ignore the second set (without using artificial aids like covering the ears). When *E* says "Write", fill in as many of the blanks in the second row below as you can in the right order.

3. The procedure of the two sections above may be repeated *in the reverse order* if time permits.

Data

(Keep all responses covered until test is over.)

Trial 1: ___ ___ ___ ___ ___ ___ ___ ___ ___ (Pause only)

Trial 2: ___ ___ ___ ___ ___ ___ ___ ___ ___ (Irrelevant digits)

Trial 3: ___ ___ ___ ___ ___ ___ ___ ___ ___ (Irrelevant digits)

Trial 4: ___ ___ ___ ___ ___ ___ ___ ___ ___ (Pause only)

Results. By a show of hands determine the number getting 9 right, 8 right, 7 right, etc., for each trial. If trials 3 and 4 were used, average the results for trials 1 and 4 and trials 2 and 3.

	Average Number Right				
	9	8	7	6	5
Trials 1 and 4:	_____	_____	_____	_____	_____
Trials 2 and 3:	_____	_____	_____	_____	_____

Discussion. 1. Is there any evidence that the irrelevant set of digits interfered with the process of recalling the first set? (The results are more likely to be valid if sections 1 and 2 in the procedure are repeated several times, not just once, and average results are used.)

2. Give other examples of this same phenomenon. What about the study of recall after equal intervals of waking and sleeping?

3. Why was it desirable to reverse the pattern of trials 1 and 2 in the later trials?

Name_____ Section_____ Date_____

CHAPTER SEVENTEEN

OBJECTIVE EXERCISES

A. True-false and Multiple-choice Questions

( ) 1. Learning, retaining, and remembering, which are included under the general head of memory, are active processes.

( ) 2. The immediate memory span increases with age up to about 18 years; it also increases with practice.

( ) 3. Intelligent memorizing of a connected passage involves an active fitting of the parts into a framework rather than mere repetition.

( ) 4. In memorizing nonsense syllables the use of rhythm, grouping, and meaning often help.

( ) 5. In the paired-associates memory test it is primarily contiguity which establishes the connections.

( ) 6. When a passage is to be recited word by word, rote memory is the best method to employ.

( ) 7. In the experiment on the relative value of reading and recitation, which distribution of the learners' time gave the highest scores in general: (1) no time devoted to recitation (2) $\frac{1}{5}$ of time devoted to recitation (3) $\frac{2}{5}$ (4) $\frac{3}{5}$ (5) $\frac{4}{5}$?

( ) 8. A judicious use of recitation is effective because it provides the reinforcement of reward and punishment.

( ) 9. Spaced learning is always more effective than massed learning.

( ) 10. The whole method of memorizing is always more efficient than the part method.

( ) 11. The hypothesis of the "memory trace" implies that retention takes place "in the unconscious."

( ) 12. Which one of the following methods is *not* commonly used to establish the existence of retention: (1) recall (2) recognition (3) relearning (4) initial learning (5) the savings method?

( ) 13. The memory trace involves a modification of structure and persists as long as the organism lives.

( ) 14. Interference rather than atrophy through disuse is the real cause of forgetting.

( ) 15. Learning the new interfered with retention of the old, and recall of the old interfered with learning of the new.

( ) 16. The rate of forgetting during sleep is slower than the waking rate for new, barely learned material.

( ) 17. In the paired-associates experiments involving the learning of two sets of response words to one set of stimulus words, the interference with the recall of the first set was greatest when: (1) the second set was slightly learned (2) the second was fairly well learned (3) the second was learned perfectly (4) both sets were learned perfectly.

( ) 18. Forgetting, especially shortly after learning, is probably best explained in terms of indirect interference.

( ) 19. It is probable that the establishment of the memory trace continues for some time after the learning period ends.

( ) 20. The effects of shock on the retention of recently learned material are in harmony with the statement in question 19.

( ) 21. The primary memory image is a recency effect or "after-image."

( ) 22. We should expect "eidetic images" most commonly in adolescents.

B. Matching Exercises

Answers: (1) recall (2) repression (3) recognition (4) power of memory (5) hallucination (6) retention (7) methods and attitudes (8) construction (9) set for behavior (10) memorizing (11) memory span.

( ) 23. A . . . . . is a memory image taken for a perception.

( ) 24. The process of recall is often a matter of . . . . . rather than "reconstruction."

( ) 25. An extreme example of emotional interference with recall is . . . . . .

( ) 26. Recognition usually involves a . . . . . conditioned by previous experience.

( ) 27. Of the four aspects of memory . . . . . is the least susceptible to training.

( ) 28. Of the four aspects of memory . . . . . is the most susceptible to training.

( ) 29. If transfer of training takes place it is usually because of an improvement in . . . . . .

( ) 30. The . . . . . is the number of items (usually digits) that can be remembered after a single presentation.

CHAPTER EIGHTEEN

Thinking

Everyone complains of his memory, but no one complains of his judgment.

La Rochefoucauld

Many a man fails to become a thinker for the sole reason that his memory is too good.

— Nietzsche

QUESTIONS FOR DISCUSSION

A. Text Questions

1. What is meant by ideational activity? Give three common examples. How does it differ from sensory and motor activity?
2. How are dreams, daydreams, and purposive thinking related? What are two common types of daydreams? What purpose do dreams and daydreams serve?
3. In what three ways is purposive thinking useful in the great human enterprises of discovery and invention?
4. What three "authorities" agree that thought and speech are closely connected? In what ways does language aid thinking? Mention several ways in which language can be a "treacherous tool of thought."
5. What is the connection between thought and muscles? How does this relate to silent speech?
6. State briefly some important relations among symbols, diagrams, words, concepts, and meanings.
7. Give a simple example of generalization and differentiation in concept formation in a child. Illustrate concept formation by an experiment and by the process of abstraction.
8. List three common obstacles to clear thinking in problem solving. Illustrate. Illustrate the value of a guiding idea in eliminating the irrelevant from a "trick problem," or in the solution of some other problem.
9. Use Harvey's discovery of the circulation of the blood as an illustration of the nature and use of hypotheses. What is the relation between hypotheses and "guiding ideas"?

10. What are the "four stages of creative thought"? Mention two theories to explain "incubation." What memory phenomenon does one of these suggest? Explain.

11. In what ways is a thinker like a rat in a maze? In what two ways does rational problem solving differ from trial-and-error learning?

12. Illustrate the use of a "middle term" in reasoning by identifying "this man" in the old riddle: "Sisters and brothers have I none, but this

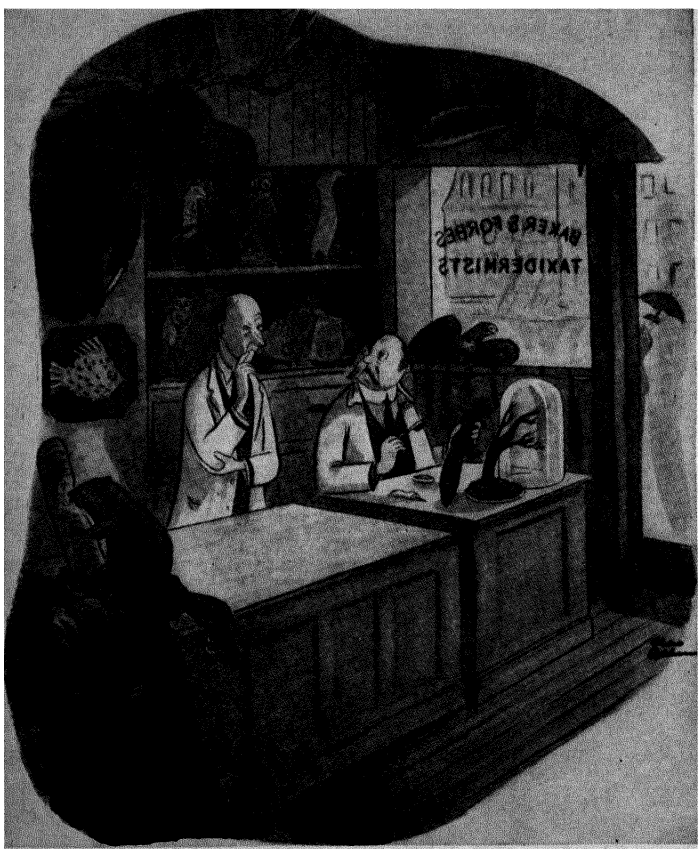

FIG. 50. "Damnation Forbes stop looking at me like that!" (*Permission Charles Addams and* The New Yorker. *Copyright The F-R Publishing Corporation.*)

man's father is my father's son." Give an example of reaching an invalid conclusion by making use of an "ambiguous middle term".

13. What is meant by a syllogism? Illustrate both a symbolic syllogism and one expressed in concrete terms which is not true. Explain.

14. What type of premise is involved in reasoning from probabilities? List four common errors which may be involved in reasoning from probabilities with variable phenomena, rather than from all-or-none premises.

B. General Questions

1. As Aristophanes might have said: "Imagination was given to man to compensate him for what he is not, and a sense of humor was provided to console him for what he is." What bearing does this have on the motivation of daydreams? Can you illustrate this from your own experience? For example, do you know any drugstore cowboys, parlor detectives, or armchair explorers? Or do you know anyone whose excessive wit seems to cover up a feeling of inadequacy? Are such compensations and consolations wholly desirable, wholly undesirable, or what?

2. If you have had any experience of this sort, take some recent little problem that has made you think, some problem connected with your academic work, your hobby, or some other phase of your daily life, and use it to illustrate the application of pertinent facts or a "guiding idea" recalled from the past.

3. Do you know any authors or speakers, or do you have any friends who indulge more heavily in "word magic" than in rational speech? Such "verbal realists" illustrate the statement that "language can be a treacherous tool of thought." Do you think they sometimes deceive themselves? Can you suggest any device which would lessen the danger of being victimized by this sort of thing, either as a member of the audience or as speaker?

4. Examine Figure 51, which indicates the presence of activity in certain muscles when thinking of action involving the use of these muscles. Do you think that some of the fatigue experienced after prolonged mental work could be eliminated if one consciously tried to minimize the muscular element in thinking? What about the importance of the emotional element in thinking? How would this tend to influence the muscles and fatigue? Could it be profitably eliminated altogether? Discuss.

5. To the celebrated modern philosopher Ted Cook is attributed the following pearl of wisdom: "The narrower the mind, the broader the statement." In cases where this charge applies, what seems to have gone wrong with the normal tasks of generalization and differentiation in concept formation?

6. Which, if any, of the obstacles to clear thinking mentioned in the text do you experience most frequently? Illustrate. What steps, if any, have you taken to overcome them? What steps do you think might be taken?

7. Does your reasoning activity ever flounder because of fixed assumptions or because of the incomplete testing of hypotheses? What devices do you use in order to get the right balance between self-criticism and self-confidence? Is there room for improvement in this matter?

8. From your own experience of work, play, or personal relationships illustrate, if you can, the "four stages of creative thought." If you have difficulty in doing this, do you think it is due in part to a too emotional

approach to your own problems? Do you think you might gain something by trying out these four processes in handling certain of your personal problems?

9. Can you illustrate from your own experience the phenomenon of the incubation of a new idea? Can you recall an experience in which frantic search for a new idea proved sterile and subsequent relaxation proved fruitful?

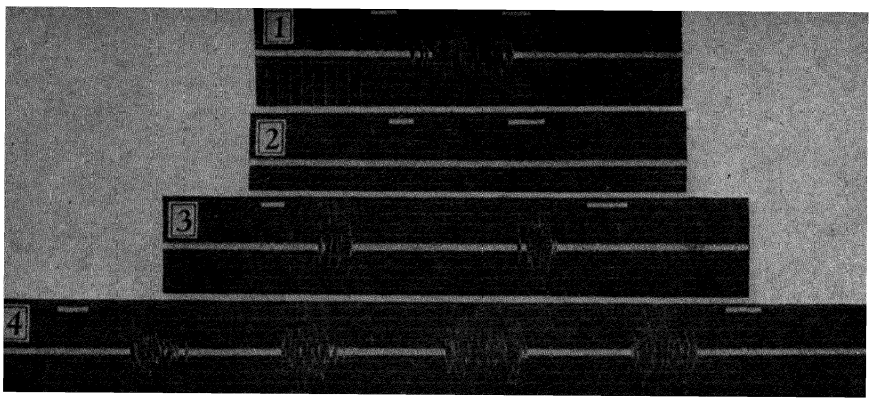

FIG. 51. The effect of mental activity on muscles related to the content of thought. These are photographic records of galvanometer deflections produced by electrical activity in certain muscles. The thick white lines in the middle of each record indicate relaxation of the muscles tested. The thin scattered lines indicate muscular contractions. The short white horizontal lines represent the starting and stopping signals to the subject.

Record 1 shows the effect on the biceps of imagining lifting a weight. Record 2 is a control record showing inactivity in the right arm when the subject was told to think of lifting a weight with the left arm. Record 3 shows the effect of imagining hitting a nail twice with a hammer. Record 4 shows the effect of the subject's imagining some rhythmical activity like rowing. (*Reproduced from Jacobson, E. "Electrophysiology of mental activities."* American Journal of Psychology, 1932, *44*, 677-694, *by permission of the editor and author.*)

10. There is a real connection between the constructive play of childhood, the daydreams of all ages, and the creative imagination of inventors and artists. Consider the Decker cartoon of the boy in the bottle, Figure 52. This may be said (with a twinkle in the eye) to illustrate the development of imagination from the constructive play of childhood. But, more seriously, what characteristic of the creative artist or inventor does this illustrate? Would you expect to find more of this characteristic in the cartoonist or humorous writer than in the mechanical or scientific inventor? Explain.

11. Give an illustration of each of the following from common experiences: (a) trial-and-error thinking, (b) the use of the "middle term," and (c) an error based on reasoning from probabilities.

12. Consider for a minute the Charles Addams cartoon in Figure 50. It may take you a few seconds to get the point. Use this as an illustration of a "guiding idea." Was your first guiding idea correct? Mention all the elements in the cartoon that fall in line with the correct guiding idea.

C. *Special Questions*

1. Robert Louis Stevenson tells us that many of his best plots came to him during sleep. The search for a new idea during the day was often fruitless, but during the night a troop of "brownies" would act out a new plot for him. Explain this in terms of the four stages of creative thought. Have you had any similar experience on a small scale? Describe it.

2. Illustrate the concepts of prediction and verification from some well-established law or principle from physics or chemistry, such as Ohm's law, Archimedes' principle, or the gas laws.

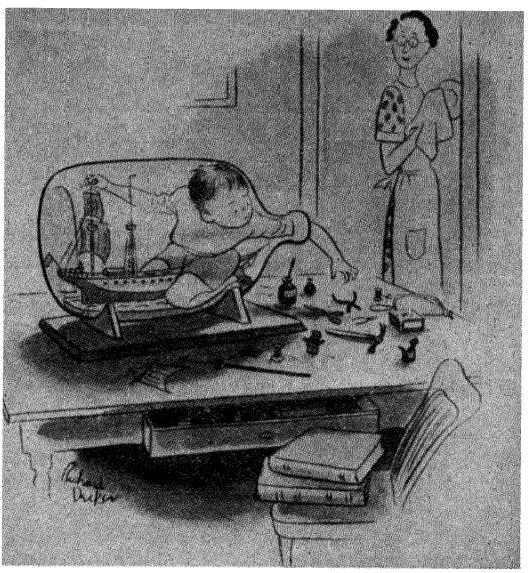

FIG. 52. "Want Mother to reach something for you, Junior?" (*Courtesy Richard Decker and* The New Yorker. *Copyright The F-R Publishing Corporation.*)

3. How many of the major suggestions for problem solving are illustrated in Pasteur's conquest of hydrophobia, or in some of Noguchi's work? Illustrate your contentions.

4. Illustrate hypothesis, prediction, and verification with reference to Medeléeff's periodic table. Take the discovery of helium, for example.

5. Illustrate the methods of scientific reasoning in connection with the discovery of the ninth planet, or in connection with Laplace's nebular hypothesis, or the Jeans tidal theory of the origin of the solar system.

6. Can the concept of the fourth dimension be understood in terms of verbal symbols? If not, how, if at all?

7. How does the geologist's procedure in locating a vein of ore or a subterranean water supply illustrate the reasoning process?

8. Play acts not only as a means of release from tension but as a stimulus to the imagination. Do you know anything of the playful element in

the creative work of such prolific producers as Bach, Mozart, and Schubert? Discuss.

9. Interpret the quotations from La Rochefoucauld and Nietzsche at the beginning of this chapter. Do they make psychological sense?

CONCEPT FORMATION

Purpose. To examine the process of forming and defining a concept; i.e., abstracting the common characteristic of a number of objects or other items.

Materials. Lists of words (see below). Watch in *E*'s hands for timing the trials.

Procedure. *E* sets the task and tells the class which word lists to use. He allows 3 minutes per trial and at the end of each trial gives the correct answers for scoring. At the end of the whole experiment, *O* writes a retrospective report and tells what he can of his procedure in reaching a concept and putting it into words or "defining the concept."

Results. *O*'s attempts at a definition and his score of correct answers may be recorded here.

Trial 1. Definition:

Trial 2. Score _____. Definition revised?

Trial 3. Score _____. Definition revised?

Trial 4. Score _____. Definition revised?

Trial 5. Score _____. Definition revised?

Retrospective report:

WORD LISTS

A	B	C	D
ability	accidental	abandon	accident
ashamed	argue	athletic	agriculture
beside	better	bewilder	beautiful
debate	characteristic	Columbus	cigarette
emergency	entertainment	diploma	democrat
grammatically	freshman	employment	easily
hurrah	invitation	importance	individual
invisible	narrow	objection	brought
particular	pattern	percentage	undermine
withdraw	undisputed	unfurnished	ungrammatically

E	F	G	H
1. parchment	1. church	1. antiseptic	1. absurd
2. adjective	2. equator	2. antagonist	2. comprehend
3. revenge	3. discontinue	3. aggressive	3. creative
4. abolish	4. desirable	4. absolute	4. double
5. colonial	5. actor	5. interrupt	5. whenever
6. camel	6. admire	6. enough	6. examine
7. auctioneer	7. experiment	7. refrigerator	7. hereditary
8. ceremony	8. bronchitis	8. contentment	8. balloon
9. canary	9. contradict	9. pursuer	9. everywhere
10. automatic	10. revolutionary	10. attic	10. captain
11. coward	11. baker	11. independence	11. evolution
12. conductor	12. accommodation	12. strong	12. wrench
13. darling	13. restoring	13. collapse	13. oriental
14. chocolate	14. vanilla	14. distracted	14. coincidence
15. collision	15. geometry	15. dollar	15. horizon
16. confederation	16. psychological	16. tomorrow	16. dormitory
17. myself	17. enormous	17. semicircular	17. forbid
18. target	18. heroic	18. entertain	18. unfortunate
19. thanksgiving	19. cruelty	19. advantage	19. salvation
20. accommodate	20. contemptible	20. indulge	20. rainbow
21. delightful	21. fundamental	21. magnificent	21. democratic
22. criminal	22. leaves	22. faculty	22. altitude
23. northeast	23. saloon	23. Alexander	23. banana
24. north	24. walnut	24. childish	24. economical

Discussion. The chief questions concern the use of hypotheses (or trial and error), and the possible factor of "composite photography" in reaching a general concept. (The "composite photography" process is a method of detecting common characteristics, which is roughly analogous to detecting the common features of two or more pictures by superimposing their films and discarding all parts which do not coincide.)

1. Were you aware of trying out one or more hypotheses? Was this method used by all the group?

2. Was there anything in your experience suggesting the "composite photography" process of reaching a generalization or a hypothesis? How did the successful hypothesis first come to you?

3. Is visual or auditory imagery of any value in this particular problem?

Films on the Impairment of Abstract Thinking in Brain-injured Humans

Several striking films which neatly demonstrate the impairment of abstract thinking in human patients with various kinds of brain injury have been produced by Drs. Kurt Goldstein and Martin Scheerer, based on a research project sponsored by the Neurological Division of the Tufts Medical School. In one of these [1] the patient, who has an injury in the parietal region of the left cerebral hemisphere, is shown carrying out several everyday activities. When the problems are concrete in every detail he is successful. When certain familiar elements are missing, he fails to get the idea and the performance breaks down, though no muscular impairment is involved. As soon as the film has been shown, fill in the parentheses below with a + for true and a − for false or partly false.

( ) 1. The patient is able to carry out the instruction to drink water from a glass.

( ) 2. He does not get the idea of going through the motions of drinking with an empty glass the first time.

[1] *Impairment of Abstract Attitude.* Silent. This film may be purchased at cost through Prof. Martin Scheerer, The New School for Social Research, 66 W. 12 St., New York, N. Y. Length, 185 ft. Price, approx. $18.00.

( ) 3. After several demonstrations by the doctor the patient imitates the act of drinking from an empty glass.

( ) 4. That the patient cannot assume the abstract attitude is shown by the fact that immediately after drinking from a glass containing water, he is unable to perform the act with an empty glass.

( ) 5. One of the patient's arms is paralyzed.

( ) 6. The patient first writes on a piece of paper and then makes writing motions in the air, when so instructed.

( ) 7. The patient is able to hammer a nail.

( ) 8. He is unable to continue hammering movements when no nail is present.

( ) 9. He is unable to grasp the abstract concept of hammering when no nail is present.

(The scoring key appears in *Notes for Instructors.*)

In a second film in this series[2], which is also highly recommended, a patient suffering from general paresis is shown working with the Kohs Block Test. He can reproduce a number of simple patterns if the model is closely similar in size and color to the pattern to be achieved, but his failures show his inability to think in abstract terms.

[2] *Impairment of Abstract Attitude Demonstrated with Colored Block Test.* Silent, colored. May be purchased at cost from Prof. Martin Scheerer, The New School for Social Research, 66 W. 12 St., New York, N. Y. Length, 400 ft. Price, approx. $50.00.

Name_____ Section_____ Date_____

CHAPTER EIGHTEEN

OBJECTIVE EXERCISES

A. True-false and Multiple-choice Questions

( ) 1. Ideational activity makes no use of present sensory or motor activity.

( ) 2. "Conquering hero" and "suffering hero" daydreams both bolster the dreamer's self-esteem.

( ) 3. Ideation plays an important role in both discovery and invention.

( ) 4. The process of discernment means putting a guiding idea to use.

( ) 5. Thinking usually involves the use of language or other symbols, and vice versa.

( ) 6. "Muscle currents" are generally more pronounced when thinking is difficult.

( ) 7. The meaning of a word is a concept.

( ) 8. It is possible to have a concept without being able to express it in words.

( ) 9. Generalization and differentiation play an important role in concept formation, as they do in conditioning.

( ) 10. Concepts deal exclusively with things; abstractions deal with their characteristics.

( ) 11. Concepts may be combined into principles, laws, and systems.

( ) 12. There is no complete protection from the danger of distorting thinking by prejudice.

( ) 13. Which one of the following is *not* stressed as an obstacle to clear thinking: (1) insufficient data (2) superfluous data (3) dispersion of data (4) data do not readily fall into a pattern?

( ) 14. An abstract guiding idea is of little or no value in the solution of a concrete problem.

( ) 15. A hypothesis is a definite question suggesting a tentative answer that is worth investigating.

( ) 16. It is a waste of time to formulate a hypothesis that has to be abandoned later.

( ) 17. The successful scientific investigator has to preserve a balance between active seeking and thoroughness.

( ) 18. A guiding idea is usually more definite than a hypothesis.

( ) 19. Which one of the following is *not* listed as one of the four stages of creative thought: (1) preparation (2) incubation (3) hatching (4) illumination (5) verification?

( ) 20. One theory of incubation involves the notion of unconscious work on a problem.

( ) 21. Another theory of incubation is based on the idea that rest reduces interference and provides a fresh view.

( ) 22. Rational thinking has little or nothing in common with trial-and-error learning.

B. Matching Exercises

Answers: (1) a bird (2) converse (3) probabilities (4) an elephant (5) middle term (6) Superman (7) not a bird (8) premise (9) validity (10) negative instances (11) syllogism.

( ) 23. In the theorem, "If two things are equal to the same thing they are equal to each other," the "same thing" is an example of a ..... in logic.

( ) 24. Logic is concerned especially with the ..... of conclusions.

( ) 25. No birds have tusks. This creature has tusks. Therefore, this creature is .....

( ) 26. Two premises and the conclusion make up a .....

( ) 27. If all X's are Y's, the ....., all Y's are X's, is not valid.

( ) 28. A conclusion that is both valid and true may sometimes follow from a false .....

( ) 29. It is more difficult to think clearly regarding ..... than to reason from all-or-none premises.

( ) 30. Errors in reasoning from probabilities often result from an inadequate consideration of ... .

APPENDIX

shoe
board
cow
front
door
house
down
DISH
chalk
hand
cow
pretty
dam
quick
robe
cow
book
stove
car
chair